A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

# Construction Methods

McGRAW-HILL PUBLISHING COMPANY, INC. • PRICE 20 CENTS

POWER SHOVEL loads blasted rock for railroad relocation preparatory to Oregon highway improvement.

APRIL 1943

**Mass Housing with Precut Lumber • Bridge Floor Paving with Pumped Concrete • Radial Wells Dewater Ground for Tunneling • Timber Construction Saves Steel in Huge Aircraft Plant**

# Millions are "*Injured*" by a Single Accident

Not so many months have passed since an accident meant little more than some personal loss and a temporary, but easily adjusted, work schedule. Today, that situation is completely changed.

Every accident of the 9,000,000 that occur annually is a national liability, affecting, not only the output of the injured worker's shop, but also the production of other shops. Yes, a single accident "injures" millions —millions of other workers who are trying desperately to reach maximum war output—millions of American citizens who are striving to retain their freedom—millions of American fighting men who never can have all the equipment and supplies they need for Victory so long as America is careless on the home front. Anything you can do to prevent accidents will be a real contribution to America's fight for freedom. Remove hazards at home, drive carefully, be considerate of others in traffic, observe safety rules when at work, promote safety and safety programs no matter what your position may be.

Start today! Think safety, promote safety! Keep more workers on the job for Victory!

ARMY E NAVY

**Enlist today in America's great crusade against accidents. For complete information write to the National Safety Council's War Production Fund to Conserve Manpower, Chrysler Building, New York City.**

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# CURRENT JOBS

## .... and Who's Doing Them

### BUILDINGS

**Public**—In California, **Robert McCarthy Co.**, San Francisco, has contract for housing units at estimated $12,000,000. **Carmichael-Olson Co.**, Cleveland, are constructing plant buildings in Ohio for estimated $7,000,000 to be financed by Defense Plant Corp. In Alabama **R. P. Farnsworth & Co.**, Inc., New Orleans, will build U. S. Courthouse and Customhouse at estimated $5,000,000. General contract for plant remodeling and additions in Minnesota went to **Standard Construction Co.**, Minneapolis at estimated $4,000,000. Contract for reconditioning, modernizing plant in Indiana went to **A. J. Glaser**, Muncie, at $4,000,000 on cost-plus basis. **Navarro Corp.**, of Pittsburgh, has contract for $2,203,820 to build 443 family dwellings in Pittsburgh. **Reimers & Jolivette**, Portland, Ore., have contract for housing and various recreational buildings in Washington at $4,124,327 and for two housing projects in Oregon at $2,458,869. In Indiana, **Wermuth Inc.**, of Fort Wayne, has contract for plant addition to cost $1,700,000 financed by Defense Plant Corp. Additional facilities for Navy Dept. to cost $2,714,000 are under construction in New York by **W. J. Barney Corp.**, New York. Contract for housing projects in Utah went to **J. I. Barnes Construction Co.**, Salt Lake City, for $2,470,000. Housing in Washington is under construction by **Myers Bros.**, Los Angeles, at cost of $1,741,300 and by **Waale-Camplan Co.**, Portland, Ore., at cost of $1,579,000. Contract for additional Naval facilities at Hunters Point, Calif. went to **Barrett & Hilp**, San Francisco, for $3,865,300.

**Industrial**—Contract for 1-story, brick, reinforced concrete addition with alterations for American Steel & Wire Co. in Illinois went to **Sumner S. Sollitt Co.**, Chicago, for $15,000,000.

### HEAVY CONSTRUCTION

Additional facilities for Navy Department are being built in New Jersey by **George H. Flinn** Corp. of New York for $4,976,900. **R. H. Wright & Co.** Inc., Columbus, Ga. has been awarded army contract for improvements in Louisiana for under $5,000,000. Contracts for $2,500,000 of army improvements in Idaho have gone to **Ertz-Burns Co.**, **D. M. Drake**, **Lorenz Bros.**, and **Parker-Schram Co.**, Portland, Ore. Contracts for Naval facilities in Glenview, Ill. were awarded to **Standard Paving Co.**, **White Consolidated Inc.**, and **Midwest Construction & Asphalt Co.**, of Chicago, for $1,670,000. **Todd Galveston Dry Docks, Inc.**, Galveston, has $1,275,000 contract for building 3,000-ton timber floating dry docks for Navy Department in Texas. Navy contract for additional improvements in New Jersey went to **Karno-Smith Co., Inc.**, Trenton, and **Duffy Construction Corp.**, New York, for $2,000,000. **Atwood Construction Co.**, Atlanta, Ga. has Army contract for sewage treatment plant in Tennessee estimated under $1,000,000. In Michigan, **McDermott & Sons**, Grand Rapids, are building sanitary sewers, sewage treatment plant, water supply lines, distribution system, water reservoirs, and pump houses for U. S. Engineer Department at less than $1,000,000. **Pacific Bridge Co.**, San Francisco, has Navy contract for steel floating dry docks in California for $13,410,000. Army contracts for improvements in Nebraska have been given to **Peter Kiewit Sons Co.**, **Sioux Syndicate**, and **Lancaster Corp.**, all of Omaha, **Olson-Assenmacher-Rokahr**, of Lincoln, and **Patti & McDonald**, Kansas City, Mo., each for approximately $2,000,000.

### HIGHWAYS

Among recent highway contract awards are the following: Arkansas: $100,000-$500,000 to **Gregory-Hogan**, Little Rock. Florida: less than $1,000,000 to **James H. Craggs Construction Co.**, of Ocala; under $500,000 to **W. T. Price Dredging Corp.**, of Miami. Idaho: low bid of $284,733 from **J. A. Terteling & Sons**, Boise. Michigan: $393,960 to **N. D. Mancini**, Detroit, and **Square Construction Co.**, Baltimore Md.; $352,147 to **Frank J. Knight**, Centerline. Newfoundland: about $1,000,000 to **Atlas Construction Co., Ltd.**, Montreal. New York: $500,000-$1,000,000 to **Wm. P. McDonald Corp.** and **Good Roads Engineering & Construction Co. Inc.**, Flushing, N. Y. Ohio: low bid of $513,794 from **Kalill Co.**, Cleveland. Tennessee: low bid of $618,164 from **A. B. Long**, Harriman. Texas: $100,000-$500,000 to **H. Page**, Austin; low bids of $201,201 from **E. W. Hable & Son**, Corsicana, and $309,044 from **Brown & Root, Inc.**, Austin.


APRIL, 1943

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# Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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N. A. Bowers (San Francisco) Nelle Fitzgerald

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## The HOW of it

***For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:***


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How **PRE-CUT AND PACKAGED LUMBER** built $15,000,000 housing project. — p. 48
How **VACUUM NOZZLE** attached to electric saw removed dust from cutting. — p. 49
How **BRIDGE DECK** was paved with pumped concrete delivered to plywood forms. — p. 52
How **HANGING SCAFFOLD** aided stripping of forms for concrete bridge deck. — p. 53
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# Food—The Deciding Issue

## *Our food problem remains to be solved*

The first thing the Germans did when they occupied Czecho Slovakia, Poland, Belgium, France—was to empty all warehouses. Everything went into trucks headed for Germany.

The Nazis knew that this war would be won by the army that had the most supplies and the best supply system.

The Nazis knew that supplies are as essential as guns. They knew that the most essential of all supplies is . . . food.

Being the only people on earth who can watch women and children starve, the Nazis seized upon food as their most powerful instrument for disciplining the masses. They added famine to their arsenal of conquest.

The flocks and herds of Europe are being consumed with alarming rapidity. The desperate shortage of meats and fats is growing steadily worse. Our Allies are short of certain foods that we must supply if we expect them to carry on.

And as we supply them, as our imports are curtailed, as our fighting men consume more than they do in civil life, and as we fail to increase our production rapidly enough . . . we, too, become short of certain foods.

Former President Herbert Hoover, speaking before a conference of the Governors and Representatives of twelve Mid-Western farming states in Des Moines on March 15th, sounded the warning that American agriculture, beset by Washington bungling on manpower, farm machinery and price systems, strangling production and distribution, is facing a deterioration which may bring on a national food shortage such as led to the collapse of Russia, the defeat of Germany in the first World War and the fall of France in the present war. Unless this deterioration is stopped, warns Mr. Hoover, we cannot hope to win the present conflict.

Complications of similar magnitude face the food processor and the distributor.

Never in the history of the world has man's dependence on food been so crucial. Yet it is not easy for us to grasp the full significance of the crisis. We are so accustomed to finding milk, eggs and butter on our doorsteps every morning, we are so used to filling our pantries from the shelves of our grocers and markets that we accept food as something that is due us on demand. We do not stop to think that we never are more than a few meals ahead of famine.

But this picture has changed. Now we are faced with food rationing, and every day the shelves of our food markets become more bare.

* * *

Let it be noted that the appointment of a Food Administrator did not solve the food problem. It is still with us; daily it becomes more critical. Unless it is solved, and solved quickly, the very food that Food Administrator Wickard said would "win the war and write the peace" may lose the war and lose the peace.

Put very simply and clearly, the food problem amounts to this: we are trying to feed upward of 200 million people. We are trying to do it with the farms and other facilities that heretofore have been capable of feeding about 145 million people (our present population plus a 5% surplus).

Had the Government foreseen the need and planned ahead, we could have begun by 1941 the enlargement of our farm production and food processing capacity. Two irreplaceable years have been lost!

The gravity of the situation becomes apparent when we consider that 50,000 factories are required to process our foods. Food processing not only is America's biggest industry—it is one of America's most important for, without processing, most foods would perish before they could reach the consumer. The term "processing" covers the salting, drying, smoking, pickling, chilling, canning, packing and other methods of preservation that make it possible for us to eat in 1943 food that was produced in 1942. Few realize that most of the food we shall eat in 1943 was produced and processed last year, that most of the seed we plant this spring will grow food for 1944 or perhaps later.

In one important process of preservation, tin and rubber are vital materials. When the Japs captured Malaya and the Netherlands East Indies more than half of the world's tin and nearly all of its rubber fell into their hands. This forced drastic changes upon our entire food economy. The importance of tinplated steel containers, tops for glass jars and rubber gaskets is fairly obvious . . . metal food containers alone consume, every year, more than 2,700,000 tons of steel.

The aggression of Japan has snared our whole food industry in a maze of intricate packing problems. It has enforced recognition of a new principle of food technology, i.e., that the *method* of food preservation is determined by the type of container available. The tin, steel and rubber stringency compels many food processors to adopt unfamiliar methods—methods that call for a great deal of new equipment. This, in turn, involves the use of critical materials that are so urgently needed for other war purposes.

This conversion of the food processing industry to meet these exacting restrictions has been greatly complicated by two factors that have increased its wartime burden. Indeed, it is these that provide the principal reason for civilian food rationing.

The first of these is the task of feeding our armed forces overseas. Allied ships are being sunk at an alarming rate and the loss of cargo is considerable.

The second factor gravely augments the first. Under Lend-Lease our country is undertaking to feed our Allies to the extent of approximately 60 million people.

Types of food required for Lend-Lease and the armed forces are the finest we can produce. They are the high protein foods, especially meats, cheese and milk; and the protective foods which rate high in vitamin content. Peculiarly enough, the more valuable a food is from a nutritive angle, the more specialized is the processing required to preserve it.

The food processing industry, handicapped as it is, is meeting today's challenge with resourcefulness and enthusiasm . . . despite container complications and shipping shortages.

It is accomplishing its Herculean task by resurrecting and modernizing a method of food preservation that is as old as mankind. Probably you have read a great deal about dehydration. You actually may have eaten dehydrated food, but right now nearly every bit of dehydrated food is earmarked for the armed forces or for Lend-Lease.

Food processing never will be as spectacular as the production of bombers or tanks. But under today's conditions, the performance of the food processor is no less important . . . no less inspiring. When we consider that dehydrated food is compressed into solid blocks with a density nearly equal to that of coal, so that almost a whole meal can be carried in a vest pocket, and that half of the shipping space is thereby saved in transportation, we begin to appreciate what the processors have contributed to meet the food problem imposed by the war.

But they have not only contributed new methods, they are achieving new highs in production. And now they are asked to do what borders on the impossible. Consider dehydrated egg powder. Normal production in pre-war years was about 3,000,000 lbs. In 1940 this was increased two and one-half times, in 1942 it was stepped up again, this time forty-fold. And in 1943 the call is for another 60 per cent boost, to make a total of 480,000,000 lbs. Dried milk powder production of 350,000,000 lbs. in 1940 must be increased to 685,000,000 lbs. in 1943.

Vegetables, which were a small item to the processor before the war, now are dehydrated in enormous quantities. The vegetable dehydration industry has had to grow by leaps and bounds without benefit of the high priorities accorded to arms, ship and aircraft building. Production of dehydrated vegetables in 1942 was four times that of 1941, and 1943 calls for a sixteen-fold increase over 1942.

Total dehydrated food production in 1943 is scheduled at 1,750,000,000 lbs., dry basis . . . *all for export*. Multiply that by 10 and you have a rough approximation of the astronomical amount of raw materials that will have to be produced.

Many problems remain to be solved in the troublesome days that lie ahead. But with all his resourcefulness, man has little control over the weather. A severe drought could wipe out all of man's carefully laid plans. If we are tempted to reassure ourselves with the thought that the food situation probably is not so serious as it is painted, it will be well to remember that last year's crop increase over 1941 was due to better than average growing weather.

The war-bred food crisis that now confronts us will be met only by immediate measures to insure a food production ample to allow for adverse weather conditions. The processing industries have demonstrated their capacity to cope with the tasks that are imposed upon them. But the food problem as a whole involves all three functions of production, processing and distribution. And if we are to master the problems that now beset us, all three of them must be coordinated under a single administrative control. "Food will win the war and write the peace". But if American food is to do that double job, we must develop a capacity for food administration comparable with the genius of our food industries.

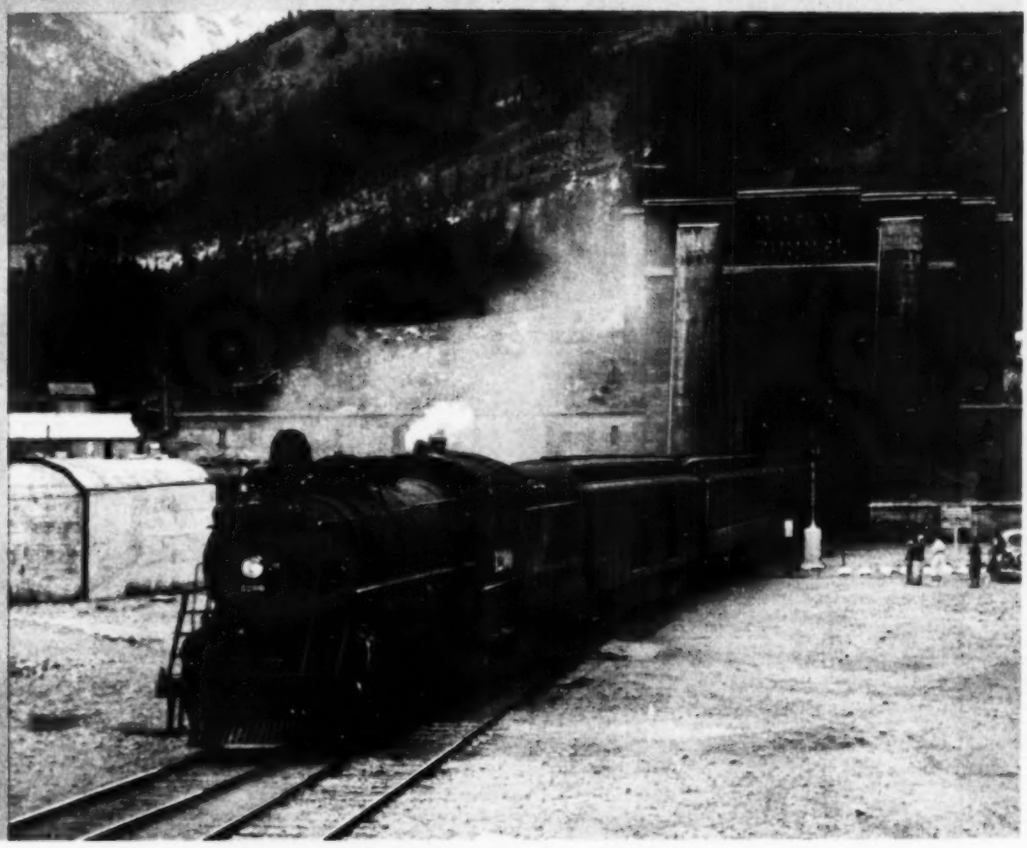
James H. McGraw, Jr.

*President, McGraw-Hill Publishing Company, Inc.*

***This is the tenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half millions readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.***

## MARKING THE 15TH ANNIVERSARY OF A NEW ERA IN CONCRETE CONSTRUCTION

In Moffat Tunnel, shifting earth and rock, compressed 6" x 10" timbers to half their thickness. In 12 to 18 hours, 'Incor' concrete took the load. No maintenance in 15 years!



# MANY HAPPY RETURNS!

FIFTEEN YEARS AGO, Moffat Tunnel was being driven through the Rockies. Trouble loomed ahead when the famous Rock Creek fault was reached. Terrific pressures from shifting earth and rock compressed 6 x 10 in. timbers to half their thickness. Ordinary concrete did not gain strength fast enough—so 'Incor' 24-Hour Cement, then undergoing final field tests by Lone Star Cement engineers, was used. In 12 to 18 hours, forms were removed. 'Incor' held back the sagging mountain. Proof aplenty of dependable high early strength.

Chapter 2—Ultimate Strength and Durability: Here, too, the record speaks for itself. For 15 years, 'Incor' has held in check the greatest pressures ever encountered in rock-tunnel work. A wire just received from the Tunnel Commission reads: "CONDITION OF 'INCOR' CONCRETE IN MOFFAT TUNNEL EXCELLENT—HIGHLY SATISFACTORY."

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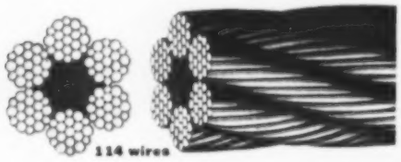
# A Short Breaking-in Period Extends Wire Rope Life

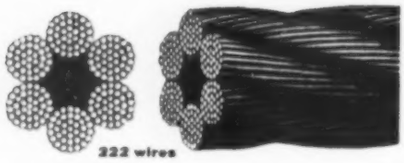
*(This is Number 14 of a series of informative articles on how to get the most out of wire rope. It is directed to those who want to do everything they can to lengthen wire rope life and conserve steel. Other articles in the series are available on request.)*

* * *

Cooperation in the present emergency is a vital necessity to success. It is a basic fundamental without which wars cannot be won, freedom cannot be maintained.

Cooperation within a piece of wire rope is just as essential to its success, but, being wire rope, it needs our help to do its job.




There are 114 or more wires in the average wire rope. They need to cooperate together by each carrying their share of the load. Illustrated above are two standard ropes showing number of wires in each.

The process of manufacture lays these wires into a rope and manufacturers ship this rope to you prepared to do its task.

The rope's success depends a great deal on how it becomes adapted to the equipment and to the work it must do.

## WHAT "BREAKING IN" MEANS

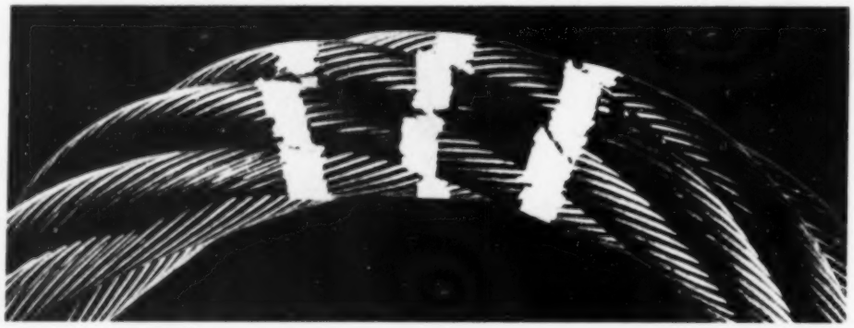
For example, we all know that the life of a book depends upon proper handling at the start. To simply grab a book and pop it open injures the binding, but by gradually and carefully opening the book at different points, it becomes "broken in" and its life is greatly extended.

Wire rope is a complex machine that has many wires, like a book has many pages. When the rope is put into use, a little care in handling and operating it at first, pays dividends later. Haste makes waste, which you want to avoid.

The breaking-in period gives the rope a chance to adapt itself to the track or path in which it must travel. It becomes accustomed to the arc of bending, becomes comfortably seated in the groove and assures the operator, after a short "trial run," that it is ready to go to work safely.

## "BUT WE CAN'T TAKE THE TIME TODAY!"

The actual time taken to properly break in a rope is a small percentage of the time it takes to install a rope. If you must replace rope often and you can cut down the number of replacements by extending rope life, you will be conserving steel, reducing costs, and actually saving time.



## BENDING DOES THIS

To get the picture (above) three white stripes were painted around a $\frac{5}{8}$" 6x37 PREformed wire rope before bending. Then the wire rope was flexed by hand and this picture taken. Notice how the paint cracked up and separated, caused by the movement of the wires and strands to make the bend. Getting the rope accustomed to this flexing and wire and strand movement is a job of breaking in.

## "WHAT SHALL WE DO?"

First, as has been explained in previous articles of this series, the equipment should be in good repair.

Second, as explained in article 9 of this series, the rope should be unwound from the reel or coil so as to avoid twisting and kinking.

Third, the rope should be firmly attached to the equipment, taking care to seize it with wire to prevent it untwisting.

Fourth, after rope is attached and reeved around sheaves and drums, operate it without load a few times, until you see that it is flexing easily over sheaves and winding correctly on the drum.

Fifth, gradually increase the speed and load until the rope is operating up to its normal loading and speed.

## WHAT ABOUT PRE-FORMED ROPE?

During the manufacture of the rope, the process of PREforming adjusts the wires and strands into the helical shape they take in the rope. This is often called a "breaking-in" process that helps prepare the rope for quick use and therefore it should not require as much "breaking in" on the job.

However, whether PREformed or non-preformed, it pays to handle the rope carefully and give it a chance to get accustomed to the operation of the equipment.

**MONARCH Whyte Strand PRE-FORMED WIRE ROPE**

. . . Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

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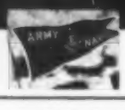
WIRE ROPE



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2. Service air cleaner and oil filler breather.
3. Check oil filter cartridge, and replace if dirty.
4. Tighten all bolts, nuts and connections.
5. Lubricate according to Euclid instruction manual.

This is only a partial list of the points that should be checked and serviced regularly — refer to your Euclid Instruction Manual for detailed instructions or write our Service Department if you have a special problem.

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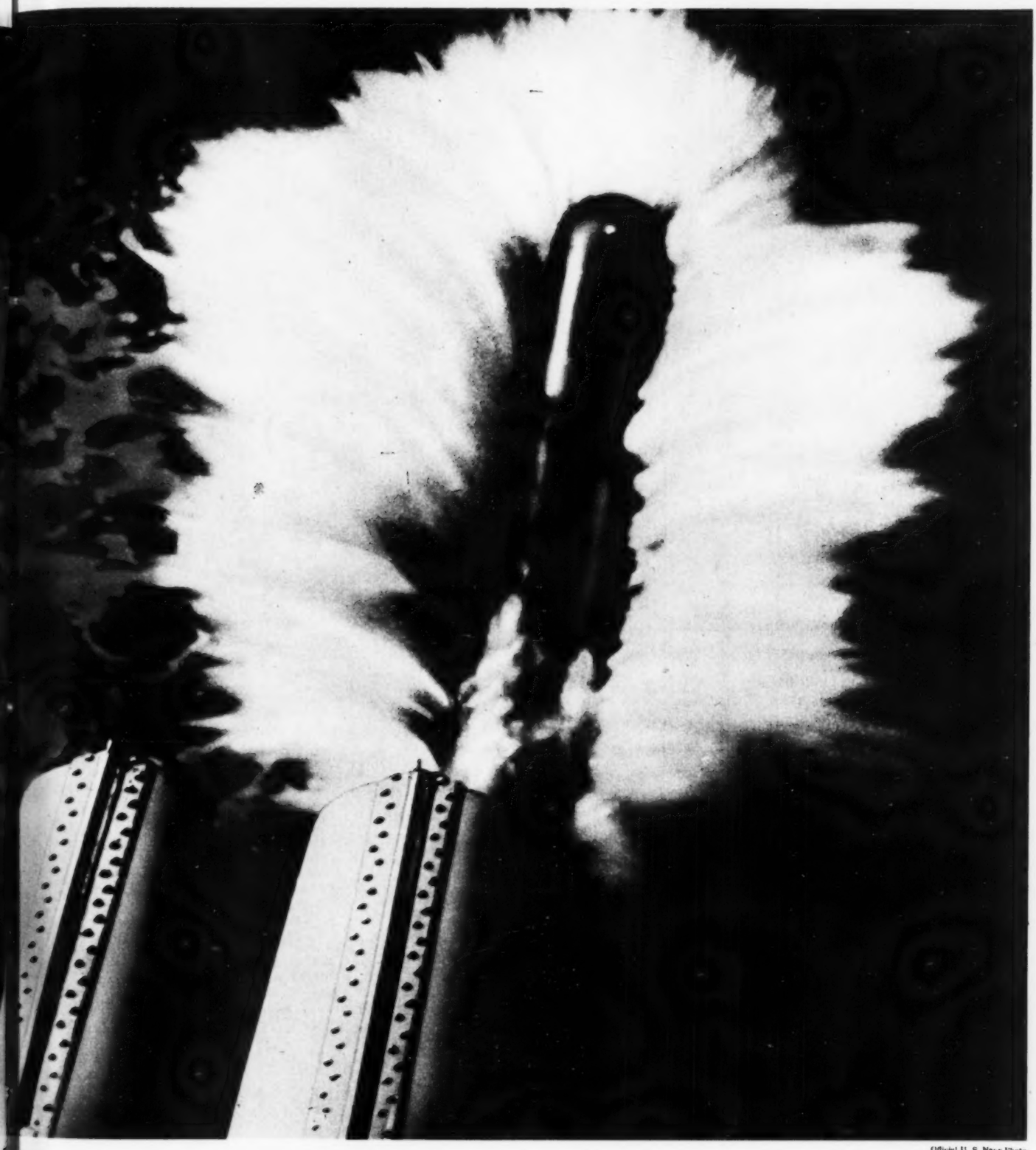
TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS



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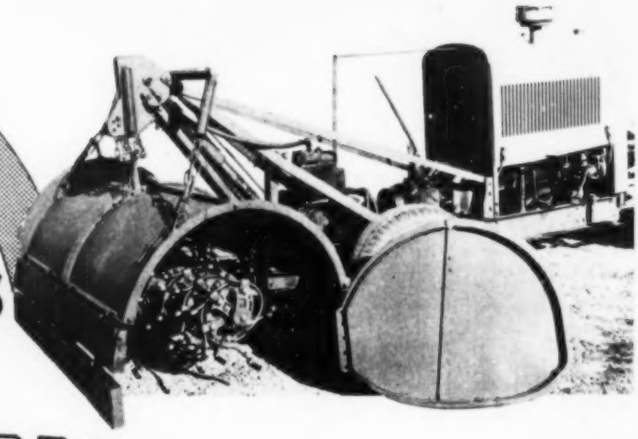
# Lubricants and Fuels

## FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

*For building*
**BETTER HIGHWAYS**
*to the* **SKYWAYS**



# ROTOTILLER

TRADE MARK REG. U.S. PAT. OFF

## ROADMAKER

SOIL STABILIZATION is speeding military operations wherever our armed forces are or go. Using local materials or any others available, highways, landing strips and airfields can be built or repaired faster, better, more economically.

ROTOTILLER Roadmaker is the pioneer "3-in-1 Rotary Action Machine" especially designed and built for soil-cement and soil stabilization work. The "3-in-1 Rotary Action" assures more accurate control in both wet and dry mixing operations as well as more thorough pulverization of materials. The fast-revolving, self-sharpening tines thoroughly mill the earth from top to bottom to a depth of 12 to 18 inches *in one operation.*

GET THE FACTS on this 1943 job-tested ROTOTILLER Roadmaker. Write for descriptive literature.

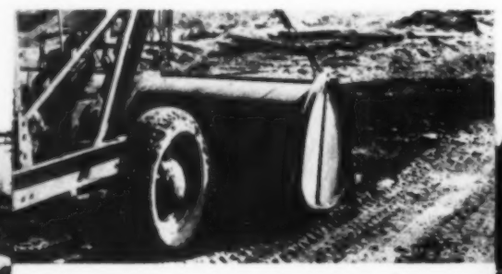
## 7 STAR FEATURES

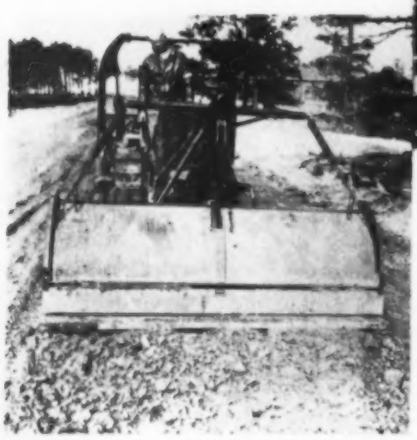
1. Improved, self-sharpening, single unit spring-tines.
2. 4-speed transmission permits use for scarifying as well as mixing.
3. Flexible tilling unit gives fast, easy operation; sharp turns with safety.
4. Weight of tilling unit variable to suit conditions; lessens wear.
5. Depth of operation regulated to within one-half inch.
6. Powerful 6-cylinder Chrysler motor operates economically on 1 to 2½ gallons of gasoline per hour, depending on conditions.
7. Strong, dependable ROTOTILLER Roadmaker cuts 6 ft. wide, 12 to 18 inches deep, with complete ROTOTILLAGE across entire width of cut — no untilled areas.

•

*Post war plans undoubtedly will call for thousands of miles of soil-cement and oil stabilized secondary roads. Returning soldiers will find economic security in this work. Then, as now, ROTOTILLER Roadmaker will serve faithfully and well.*

**ROTOTILLER, Inc.**
Dept. M TROY, N. Y.





ABOVE: Mixing clay and sand to depth of 12 to 14 inches on experimental project for U. S. Naval Construction Battalions (Seabees). Note fine pulverization and uniformity of mix.

LEFT: Scarifying to rebuild old road.

RIGHT: ROTOTILLER Roadmaker takes sharp turns with safety without taking tines from ground or stopping tillage unit.

# 10 COMMANDMENTS FOR LONGER ROPE LIFE

*not forgetting*

HAZARD'S *ENDURING*

**LAY·SET** *Preformed*

Conserve steel by making every piece of equipment last longer. Steady production by keeping your machines in uninterrupted operation. Since the operation of your machines depends upon wire rope, make sure your operators keep these commandments:—

1. Inspect, clean and lubricate all wire rope regularly. Tighten fittings.
2. Be sure the rope is the proper one for the service. Ask your Hazard wire rope man.
3. If drums or sheaves are small, or the kinking tendency pronounced, specify LAY-SET Preformed, the rope that resists bending fatigue and kinking.
4. Check your sheave or drum grooves. Worn grooves play havoc with wire rope.
5. Don't let rope rub against any standing part.
6. If the rope deviates from the center plane of the sheave more than 1½ degrees, undue wear will result.
7. Keep sheaves aligned and bearings tight and properly lubricated.
8. Don't allow bad spooling on drums. Hazard LAY-SET Preformed spools evenly under most conditions.
9. Don't jam on power or brake. Jerky operation accelerates rope failure.
10. Don't let a load spin and twist the rope.

Get the experienced recommendations of a Hazard wire rope man. Specify Hazard LAY-SET Preformed for a rope that resists bending fatigue, kinking and snarling. Use LAY-SET because it spools better, is faster and safer to handle, lasts longer.

Keep equipment in good condition. Make it last longer.

**HAZARD WIRE ROPE DIVISION**

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

**AMERICAN CHAIN & CABLE COMPANY, INC.**

BRIDGEPORT, CONNECTICUT

GREEN SIGNIFIES SAFETY

**HAZARD LAY·SET *Preformed* WIRE ROPE**

# SOLD FIRST

## A YEAR OLD BABY NOW MAKES ITS

# Thor

# ¼" ELECTRIC DRILL

## WITH HOUSINGS OF

# THORITE PLASTIC

**Check these OUTSTANDING ADVANTAGES**

- MORE POWER PER POUND
- LIGHTER
- COOLER TO HANDLE
- STRONG and STURDY
- COMPACT
- GREATER PROTECTION FROM SHOCK

***Under Army Contract for almost a year, Thor plastic-housing ¼" Electric Drills now are available for general distribution.***

OUT OF THOR LABORATORIES a year ago this April, there came the first successful ¼" electric drills to appear on the market with housings of "THORITE" Plastic. First sale on these machines, went, naturally, to Uncle Sam. The Army, a year ago this May, contracted for them—and a companion machine made of pressed steel—in an unheard of quantity. Into immediate production went these new "THORITE" plastic drills to be supplied in ever-increasing numbers for duty all over the world.

Pioneered by Thor, they were the first successful major electric tool development to conserve aluminum. Actual, day-after-day use has PROVED that these Thor "plastic" drills can take it and stand up under the toughest conditions to provide dependable performance and more power per pound than any other heavy-duty ¼" electric drill on the market today! Modernly designed with the entire case made of new, strong, specially-developed "THORITE" Plastic, these Thor drills are lighter, cooler to handle, safer, sturdy and powerful.

With current military requirements nearing completion, these Thor "plastic" drills are now available to war industries.

# TO UNCLE SAM!

## PUBLIC APPEARANCE!

### "Thorite" GEAR CASE COVER

Held in position with metal protection nut threaded directly to inner metal skeleton frame and locked against metal centerplate.

These "THORITE" plastic drills are powered by the famous Thor hevi-duty motor; have "Silent Type" over-size fan to provide abundant ventilation; and over-size pitch, alloy-steel gearing for efficient power transmission.

### "Thorite" FIELD CASE

Slides over skeleton frame, is held in keyed position against metal centerplate and locked by grip handle which is securely screwed to inner metal frame.

Bearings, gears, stator, armature, centerplate and other internal power unit parts are supported on a sturdy, inner metal skeleton frame to insure close tolerance in alignment of working members.

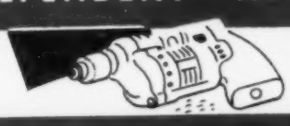
### "Thorite" GRIP HANDLE

Slides over end of inner metal frame, is held securely against field case in keyed position and locked directly to inner frame by screws.

The plastic housing does not support any working members of the machine, but serves simply as a protective covering for the inner, independent assembly of the tool.

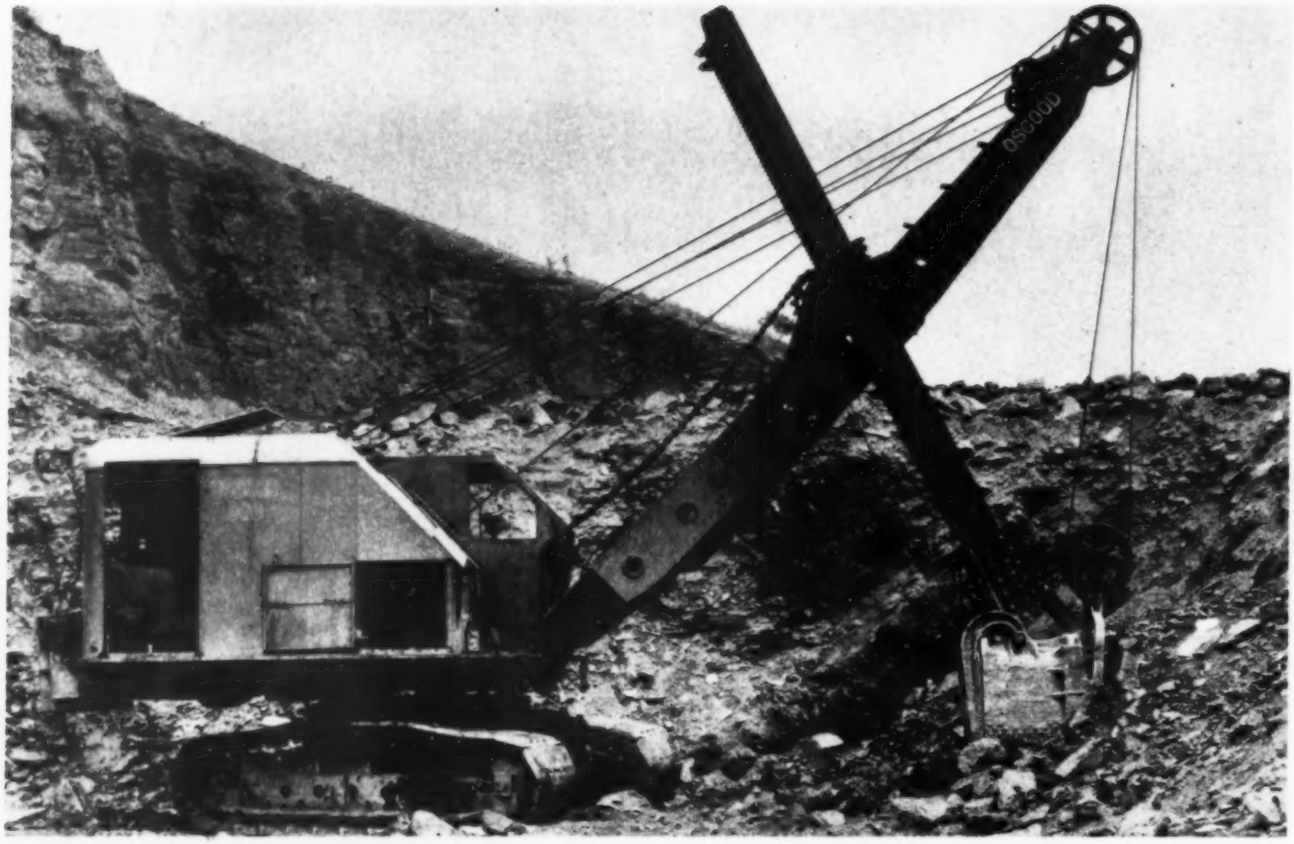
Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY



600 W. JACKSON BOULEVARD, CHICAGO, ILL.

*Branches in Principal Cities*




# OSGOOD

recommends the continued purchase of War Bonds and Stamps—and the observance of preventative maintenance to keep your machinery running.

## OSGOOD AIR CONTROL

the smooth, velvety, effortless control force with the operating ease and efficiency of steam. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing.

The **GENERAL** EXCAVATOR CO.

Sizes: ⅛ - ½ - ¾ - 1

DIESEL · GAS · ELECTRIC

Associated with THE OSGOOD CO

The **HERCULES** COMPANY

HERCULES *IRONEROLLERS*

6 to 12 Tons

Diesel or Gasoline

Associated with THE OSGOOD CO.

**OSGOOD**

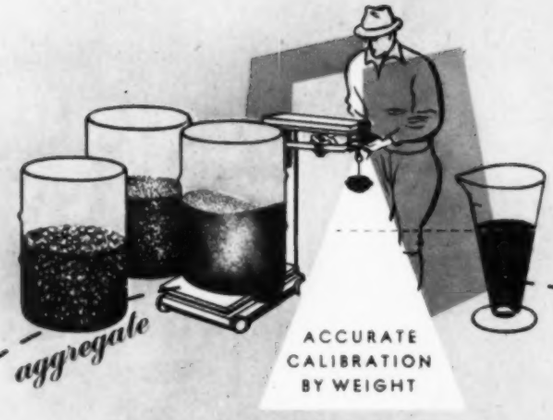
Sizes: ⅜ to 2½ Cu. Yd.

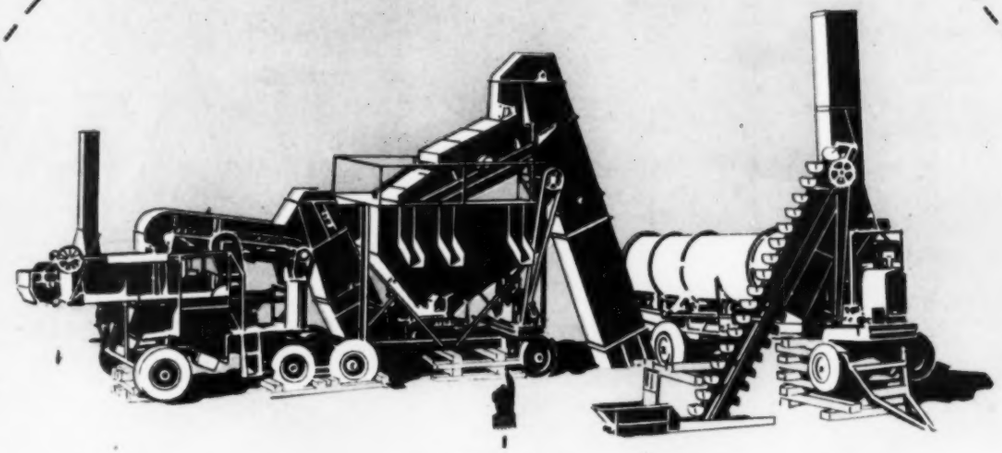
Diesel-Oil-Gas-Electric

SHOVELS DRAGLINES - CRANES

Crawler & Wheel Mounted

THE OSGOOD COMPANY, Marion, Ohio

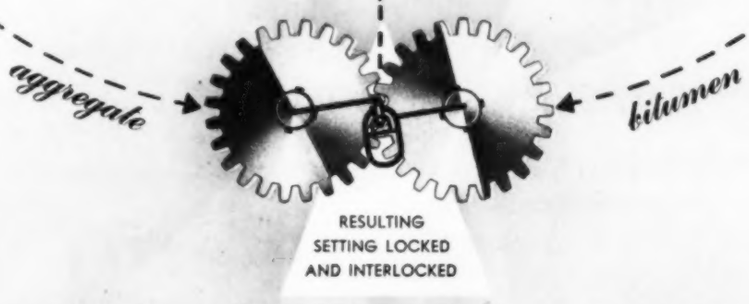


*Only*

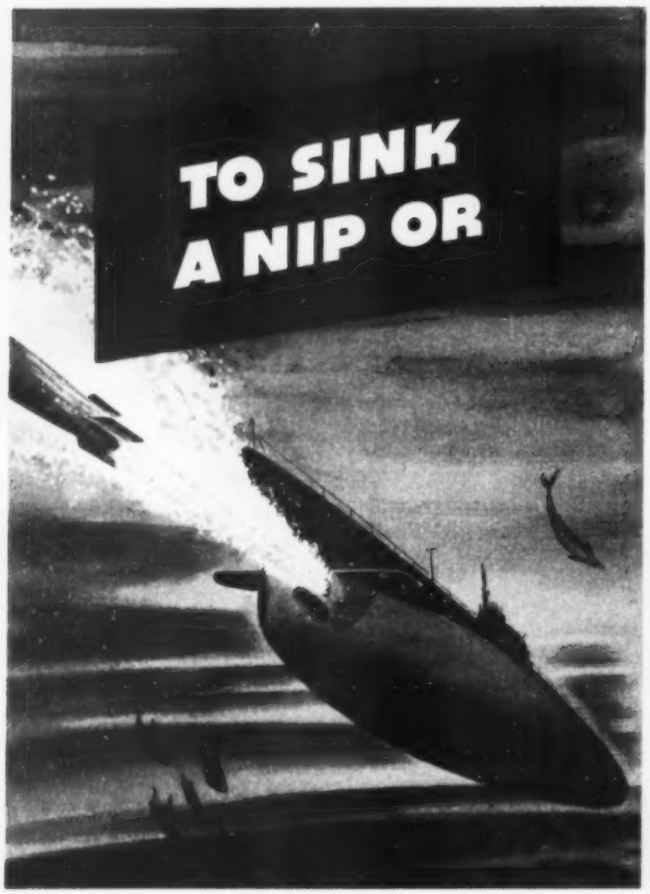
**WITH A BARBER-GREENE**

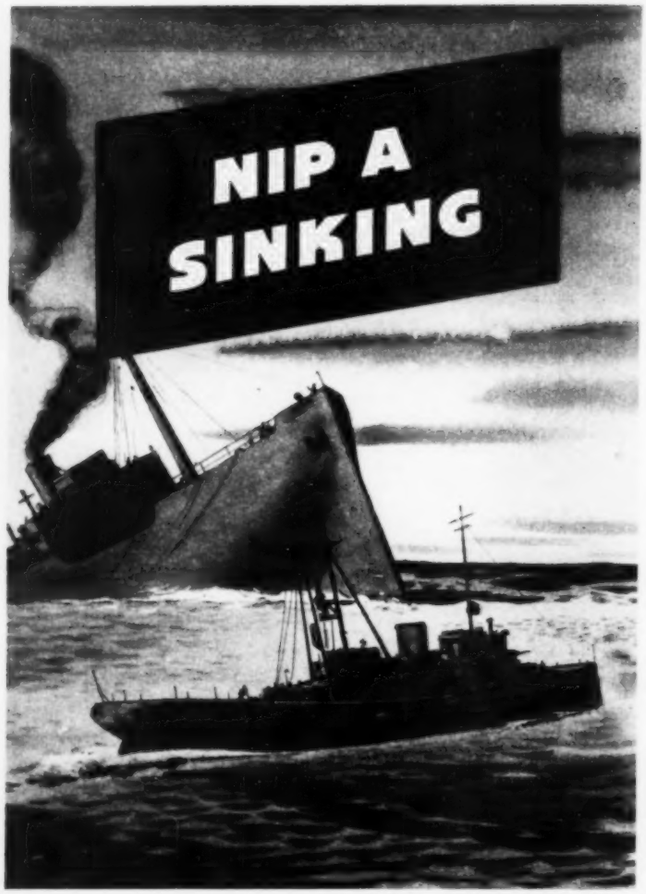
*Continuous Mixer*




The simple procedure illustrated above accounts for the untiring accuracy of the Barber-Greene. The desired quantity of each size aggregate is weighed, and the feeder gates locked at this setting. The bitumen metering pump is set for the desired ratio, and mechanically interlocked with the aggregate feeder. The Barber-Greene achieves POSITIVE PROPORTIONING in bituminous mixing. Feeding these accurately proportioned materials into the twin pugmill in a proportioned continuous stream, the Barber-Greene easily delivers a uniform mix, ton after ton—mile after mile. The Barber-Greene has set entirely new standards for short inexpensive moving and set-up time. Investigate this ingenious machine. Complete literature on request. Barber-Greene Company, Aurora, Illinois.

**BARBER-GREENE**




# . . . the Navy uses RPM DELO!

**The men who fight** in U. S. Navy submarines believe that Japan is entitled to half the Pacific—the bottom half! That's where they're sending thousands of tons of enemy shipping.

But this isn't a one-way war. Many of our ships have been damaged, too — and would have sunk except for rescue by one of the Navy's ocean-going tugs. These sturdy ships are vital units of the Fleet, constantly on the alert to hold down our losses by towing crippled ships to bases where they may be repaired to fight again.

Submarines and tugs of the Navy both use RPM DELO to lubricate their powerful Diesel engines. So do other types of Navy craft. Day in and day out, RPM DELO in Navy Diesels is meeting and beating some of the toughest lubricating problems in history.

In *your* Diesels, too, RPM DELO will give dependable protection, freedom from ring-sticking and sludge trouble. No other oil combines its anti-oxidant, cleaning and non-corrosive properties. Switch now to RPM DELO.

**STANDARD OIL COMPANY OF CALIFORNIA**

RPM DELO
HEAVY DUTY MARINE DIESEL ENGINE LUBRICATING OIL

**ORDER RPM DELO FOR YOUR DIESELS**

**RPM DELO is marketed under the following names:**
**RPM DELO • Caltex RPM DELO • Kyso RPM DELO**
**Signal RPM DELO • Imperial-RPM DELO • Sohio RPM DELO**
CONCENTRATE
**Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity**

# You Can Depend on Your JAEGER Distributor

for EQUIPMENT
for SERVICE
REPAIR PARTS
IN STOCK:
JAEGER SPEEDLINE
MIXERS with Machined Steel Drum Tracks, Automotive Type Transmission—to Mix Faster, Run Quieter, Longer.
IN STOCK: JAEGER
"SURE-PRIME" PUMPS
—the Pumps that Give You CERTIFIED HIGH PERFORMANCE . . . Every Unit Individually Factory Tested . . . Sizes to Meet Your Need.
FOR IMPORTANT PAVING JOBS:
SCREW SPREADERS and TYPE "H" FINISHERS
—the Method Which Made Today's Pace Possible on Airports and Strategic Roads

## More Than 100 Service and Supply Stations—as Close as Your Telephone:

Wherever important construction and paving work are being done today, there is a Jaeger distributor close by —with the experience, the equipment and the organization to help you lay out and equip your job and keep your equipment rolling.

**Complete Stocks of Parts**—on hand to save you costly lay-ups and delays.

**Trained Mechanics,** with factory shop facilities to check, repair and keep your equipment working efficiently.

**Stocks of Jaeger Pumps and Mixers,** for sale or rent, in many sizes.

**Direct Help on Your Paving Problems:** Men who know today's methods and machinery and the local conditions will help you to lay out your job and meet your schedules. Jaeger traveling engineers are also available for special problems of spreading and finishing airports or strategic pavements, both concrete and bituminous.

**THE JAEGER MACHINE COMPANY, 800 Dublin Ave., Columbus, Ohio**

**THOUSANDS OF REPAIR PARTS** for Major Items of Contractors' Equipment are Quickly Available to You from Our Distributors' Stocks.

**MECHANICS WHO "KNOW THEIR STUFF"** You will find Jaeger distributors outstanding in the caliber of their service organizations and shop facilities.

# The Red Cross has Problems like your own

## —*of Planning*

Your Red Cross operates a vast planning program to enable it to be ready for any disaster or emergency anywhere—whether it comes in the Americas, Europe, Australia, Asia, or Africa.

## —*of Organization*

Your Red Cross is responsible for the smooth operation of 3,750 chapters and 6,000 branches, all engaged in the same enterprise of helping all who need help.

## —*of Personnel*

Your Red Cross has tripled its staff since Pearl Harbor and has had to enlist the aid of and train over 6,000,000 volunteers in the principles of First Aid, Water Safety, Accident Prevention, Home Nursing, Nutrition, Nurse's Aideing, Mass Feeding, Motor Mechanics, and other subjects allied to our country's war effort.

## —*of Production*

Your Red Cross is not only one of the world's foremost purchasers of supplies, but it has the immense distribution job of collecting millions of items from 10,000 different communities in the United States, assembling and storing them, and then shipping them to practically every country in the world. Last year your Red Cross shipped some $60,000,000 worth of food, clothing, and medical supplies to over 20,000,000 homeless people in foreign countries.

## —*of Finance*

Your Red Cross, whose war-time and post-war expenses will run well into hundreds of millions, must account to the public for every penny it collects and puts to work. Its accounts are audited annually by the U.S. War Department.

**The Red Cross faces the same problems as are in your business. With your support it can successfully meet them.**

**The Second War Fund is greater than the First, but no greater than the increased needs.**

**Business men can help with time and with money, as organizations and as individuals.**

**March is the Red Cross month ... Cooperate with your Red Cross Chapter.**

Your Dollars help make possible the

**AMERICAN RED CROSS**

*This space contributed by the Publisher*

# Tires Made with B. F. Goodrich Synthetic Now Rolling on Army Trucks

***A typical example of B. F. Goodrich leadership in truck tires***

MANY a U. S. Army truck is rolling today on tires made with B. F. Goodrich synthetic rubber—Ameripol. Here man-made rubber is getting its final tests—tests no proving ground could ever match.

And big city buses in Chicago, New York, Boston, Cleveland, and other cities are now rolling on tires made with B. F. Goodrich synthetics, too.

This does not mean that synthetic rubber is plentiful. Only a fraction of the nation's requirements is being produced today. But it does mean that B. F. Goodrich, the only company to offer tires made with synthetic rubber to the general public before the war, is still pioneering in this great development.

And it means that America will never again be entirely dependent upon foreign sources for its rubber supply. With peace, your truck and your car may have tires made wholly or partially of synthetic rubber. When that time comes remember that B. F. Goodrich, 'way back in 1940, was *first* to offer tires of synthetic rubber for sale.

# A New Definition

# for the Industrial Dictionary

**New ideas create new products, new methods, new words to describe them. And out of this war a word is emerging with a new meaning for future industrial progress—"Synergism."**

War production has brought gigantic strides in industrial cooperation. Men have banded together to cooperate with a will-to-accomplish in a degree far greater than ever the world has known.

As minds meet to cooperate with the single purpose of accomplishment, they stimulate each other to create more than the sum total of the ideas expressed—"click to give a plus value" might be the slang for it. This is "Synergism."

Synergism is not a new word. It's an old word, with classic Greek roots meaning "working together." It long has had its meaning in chemistry, in medicine, in theology. Basically, it has always meant forces working together to develop a whole greater than the sum of the parts.

And war accomplishment has re-introduced "Synergism" with a significant meaning for Industry. It provides a name for the factor that keeps working miracles in industrial progress.

We at Atlas have been practicing synergism in our spheres of chemical production to accomplish some outstanding results in collaboration with other companies. We think our minds will "click" with yours. Let us try the experiment.

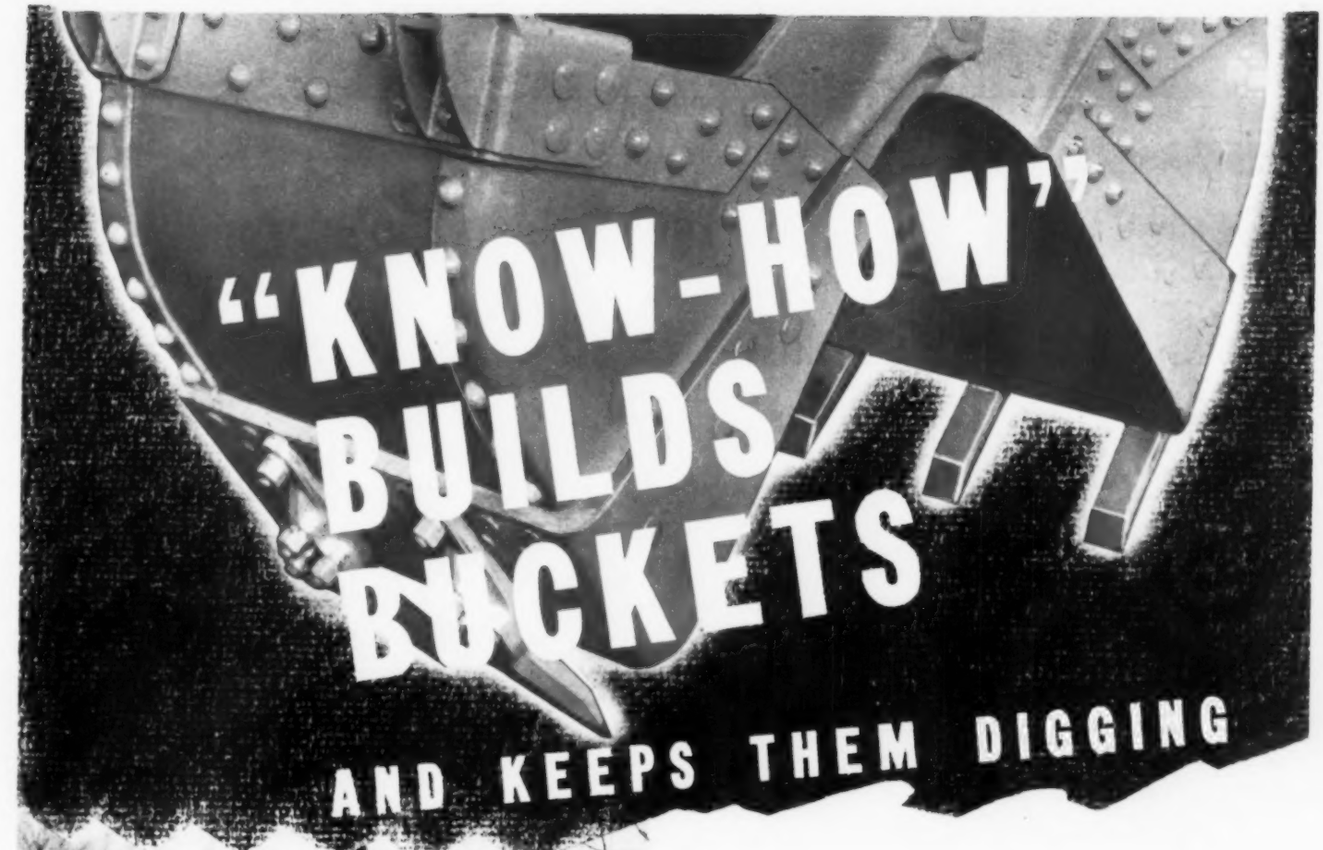
## ATLAS POWDER COMPANY

**WILMINGTON, DELAWARE**

*Offices in Principal Cities*

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

*Copyright 1943, Atlas Powder Company*



Back of every Blaw-Knox Bucket in the field there is a card record at the factory which bears the history of the bucket throughout its life.

A review of the card records representing thousands of Blaw-Knox Clamshell Buckets furnished to contractors for all types of service during the past twenty-seven years, shows that a surprisingly large number of old buckets are still on the job, digging and rehandling material.

There is only one logical conclusion. Clever bucket design, backed up by experience and field service—good, husky construction—the selection and use of proper materials—are the reasons why so many contractors prefer and buy Blaw-Knox Clamshell Buckets.

Contractors can be assured that Blaw-Knox engineering skill and highly developed manufacturing technique will continue to keep Blaw-Knox Buckets—*tops*.

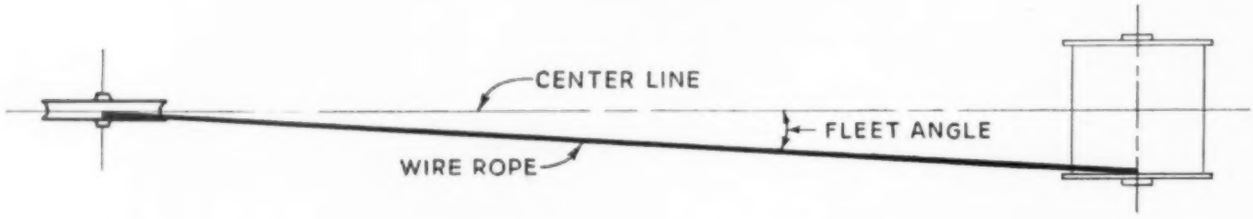
**BLAW-KNOX**

**BLAW-KNOX DIVISION**
**OF BLAW-KNOX COMPANY**
2086 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK · CHICAGO · PHILADELPHIA
BIRMINGHAM · WASHINGTON
Representatives in Principal Cities

★ ★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★ ★

# Keep fleet angles under 3 deg.

## for best service from wire rope




The "fleet angle," illustrated above, is an important consideration when locating a main sheave in reference to a winding drum. If this angle is too large, there will inevitably be side-wear on the rope as it passes diagonally from the outside edge of the drum across the sheave.

Experience has shown that best results are obtained when the fleet angle is not greater than 1½ deg., with a smooth-faced drum, and not greater than 2 deg. with a grooved drum. When the fleet angle exceeds a maximum of 3 deg., wire rope service life is materially reduced. If these recommended fleet angles are followed, you will get a lot of extra service from wire rope.

Another worth-while maintenance precaution is proper alignment of sheaves. Proper sheave alignment seems like such a small matter that it may be overlooked in busy times—yet it can add greatly to wire rope service life.

To line up two sheaves properly, simply adjust them so that the rope runs straight from one to another and seats squarely in the center of each sheave groove. Even a slight misalignment can cause a great deal of wear between the rope and the shoulder of the sheave.

On certain types of work it is well to check sheave alignment from time to time during operation, to catch and correct any deviation from true alignment. For example, on timber-mounted drag-scrapers and slack-line excavators, the sheaves are apt to slip out of alignment due to a loosening of the mounting in the wood.

Mining machines—loaders, slushers and tugger hoists—should also be frequently inspected. Wire rope that operates in a mine is subject to severe wear under the best of conditions. Help the rope with maintenance precautions, wherever possible.

A third practical suggestion is to inspect the wire-rope system of clam-shell buckets for wobbly sheaves and to replace worn sheave bearings or worn axles where necessary. A wobbly sheave, or a badly worn sheave, can greatly reduce the service life of a wire rope.

**Bethlehem Wire Ropes for all Purposes**

**BETHLEHEM STEEL COMPANY**

BETHLEHEM STEEL

# He turns SECONDS into CONCRETE

Lost seconds can mean the difference between 5000 and 7700 square yards of smooth airport runways in 24 hours.

Rex Mechanical Engineering prevents lost seconds by providing perfect timing for 7 paver functions—*by making the timing automatic.*

It is the only automatic control that can be set to a 1, 2, 3, 4, 5 or 6-second cycle change and perform the same identical cycle every time.

It is one of the many inventions that Rex Mechanical Engineering—Rex M. E.—has provided in machines for mixing concrete, placing concrete and removing water *at maximal efficiency and minimal cost and waste.*

REX

**CONSTRUCTION MACHINERY**

*Concrete Mixers • Moto-Mixers*
*Pumpcretes • Speed Prime Pumps*
*Mortar and Plaster Mixers • Pavers*

**CHAIN BELT COMPANY OF MILWAUKEE**

# Just What You Need for PAVING BREAKING

C7 in action

WHATEVER your requirements, there is a Cleveland Paving Breaker exactly suited to the job. The 80 lb. C7 is the right tool for average work—two C7's run from a No. 85 compressor. For heavier work, use the C9; it is 2 lbs. heavier, but uses no more air. C9 is a slugger that licks the toughest, reinforced concrete. For light work, trimming, etc., try the C10, the little fellow with the big wallop. Three C10's run from a No. 85 compressor. Model C11 is the 58-pound machine with the long stroke and the heavy "slugging" blow—a favorite wherever used. Extremely economical as to air consumption.

Among accessories you can't beat "Clevaloy" chisels, moils and miscellaneous paving breaker tools. Try the 14" narrow chisels, they cost no more than moils, but cut faster. Then specify tough, durable Cleveland "Veribest" air hose. Finally, connect it with Cleveland quick-acting Type "A" hose couplings, and you are all set for the toughest paving breaker job.

*Ask for Bulletin 128 on Cleveland Paving Breakers*

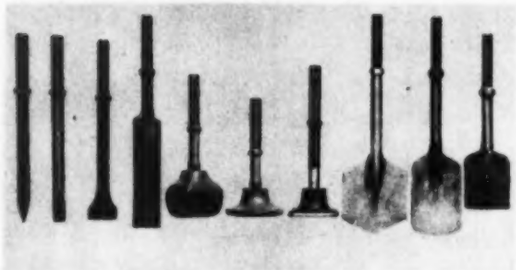
**BRANCH OFFICES**

| | | | |
|---|---|---|---|
| Birmingham, Ala. | Chicago, Ill. | Lexington, Ky. | Richmond, Va. |
| Berkeley, Calif. | Cincinnati, Ohio | Los Angeles, Calif. | Salt Lake City, Utah |
| Boston, Mass. | Dallas, Texas | Milwaukee, Wis. | St. Louis, Mo. |
| Buffalo, N. Y. | Detroit, Mich. | New York, N. Y. | Victor, Colo. |
| Butte, Mont. | El Paso, Texas | Philadelphia, Pa. | Wallace, Idaho |
| | Ironwood, Mich. | Pittsburgh, Pa. | Washington, D. C. |

**CANADIAN DISTRIBUTORS**

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

***BUY U. S. WAR BONDS AND STAMPS***



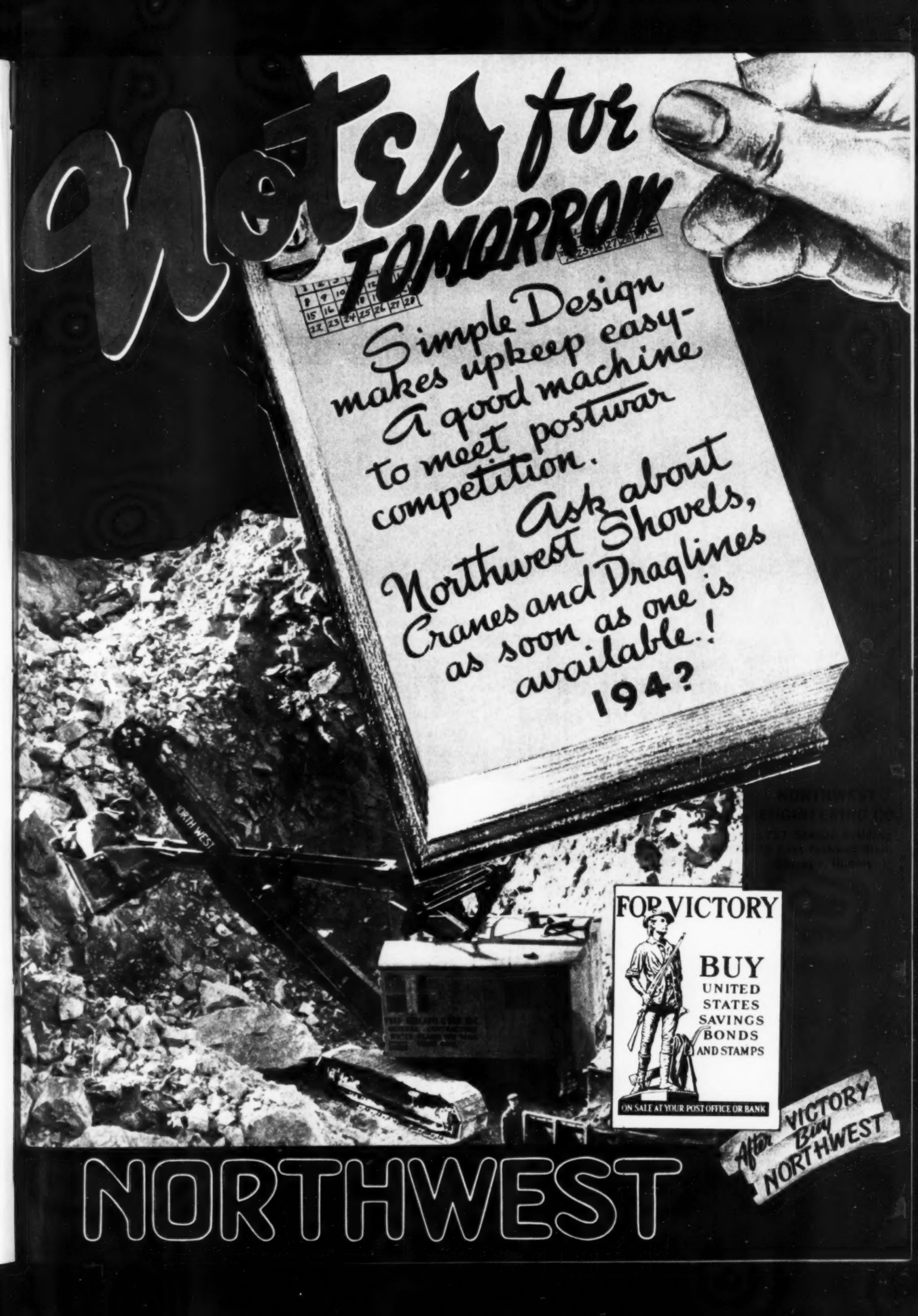
Moil Chisel | Narrow Chisel | Wide Blade | Digging Blade | Sheeting Driver | 7" Tamper Bar | 5" Tamper Bar | Clay Blade | Clay Spade | Asphalt Cutter

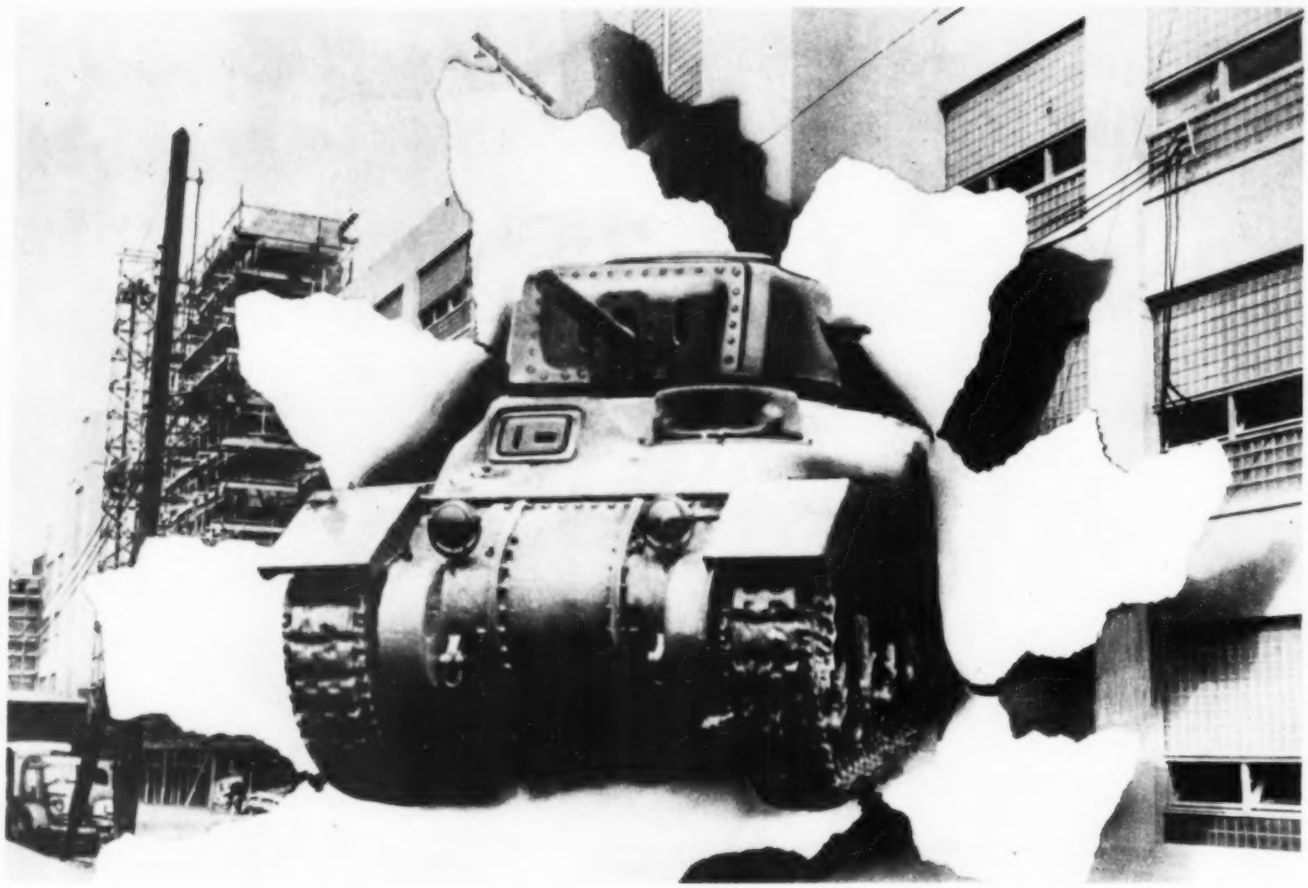
## THE CLEVELAND ROCK DRILL COMPANY

*Subsidiary of The Cleveland Pneumatic Tool Company*

**CABLE ADDRESS: "ROCKDRILL" • CLEVELAND, OHIO**

**LEADERS IN DRILLING EQUIPMENT**


Notes for TOMORROW
Simple Design makes upkeep easy- A good machine to meet postwar competition.
Ask about Northwest Shovels, Cranes and Draglines as soon as one is available.!
194?
FOR VICTORY
BUY
UNITED STATES SAVINGS BONDS AND STAMPS
ON SALE AT YOUR POST OFFICE OR BANK
After VICTORY Buy NORTHWEST
NORTHWEST



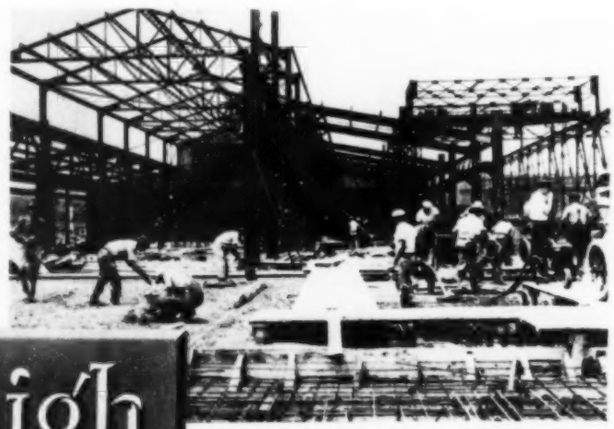
## Armament has a CONCRETE background

A job well done calls for a wise and careful beginning. That's why much of the foundation work of America's munitions program has literally been laid in concrete.

For many of the new munitions plants, created by our war requirements, Lehigh Cement made the concrete. When key sections of the jobs called for service strength concrete in a hurry, it was often Lehigh Early Strength Cement that got the call . . . for this speedy specialist makes a finer, denser concrete in 1/3 to 1/5 the normal time. Think of that when you want to speed up the job and save precious construction time, labor and often, costs.

In private work and in war construction alike, this time-saving cement offers many major advantages. Use Lehigh Early Strength Cement for all your concrete construction: ask the Lehigh Service Department for data or counsel at any time.

**LEHIGH EARLY STRENGTH CEMENT**
**for service-strength concrete in a hurry**



**Lehigh CEMENT**

**LEHIGH PORTLAND CEMENT COMPANY** • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

# Here's your FREE Manual

## on ATHEY EQUIPMENT MAINTENANCE

**Just published — a booklet giving wartime maintenance information for owners of Athey Forged-Trak Trailers and Logging Cruiser Wheels — to help you get longer service from your present equipment. It explains ways to make emergency repairs that save time and vital war-needed materials — suggests steps to follow in the operation of your machines which insure longer life, lower upkeep. Illustrated with pictures and sketches, this booklet contains condensed, helpful facts that Athey owners and operators can put into immediate use. Get your copy of this booklet right away. Ask your Athey-"Caterpillar" Dealer, or mail the coupon at the right direct to Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Illinois.**

*Send for your Copy Today*

**ATHEY**

**Forged-Trak Trailers**

**Logging Cruiser Wheels**

ATHEY TRUSS WHEEL CO., CM
5631 W. 65th Street,
CHICAGO, ILLINOIS

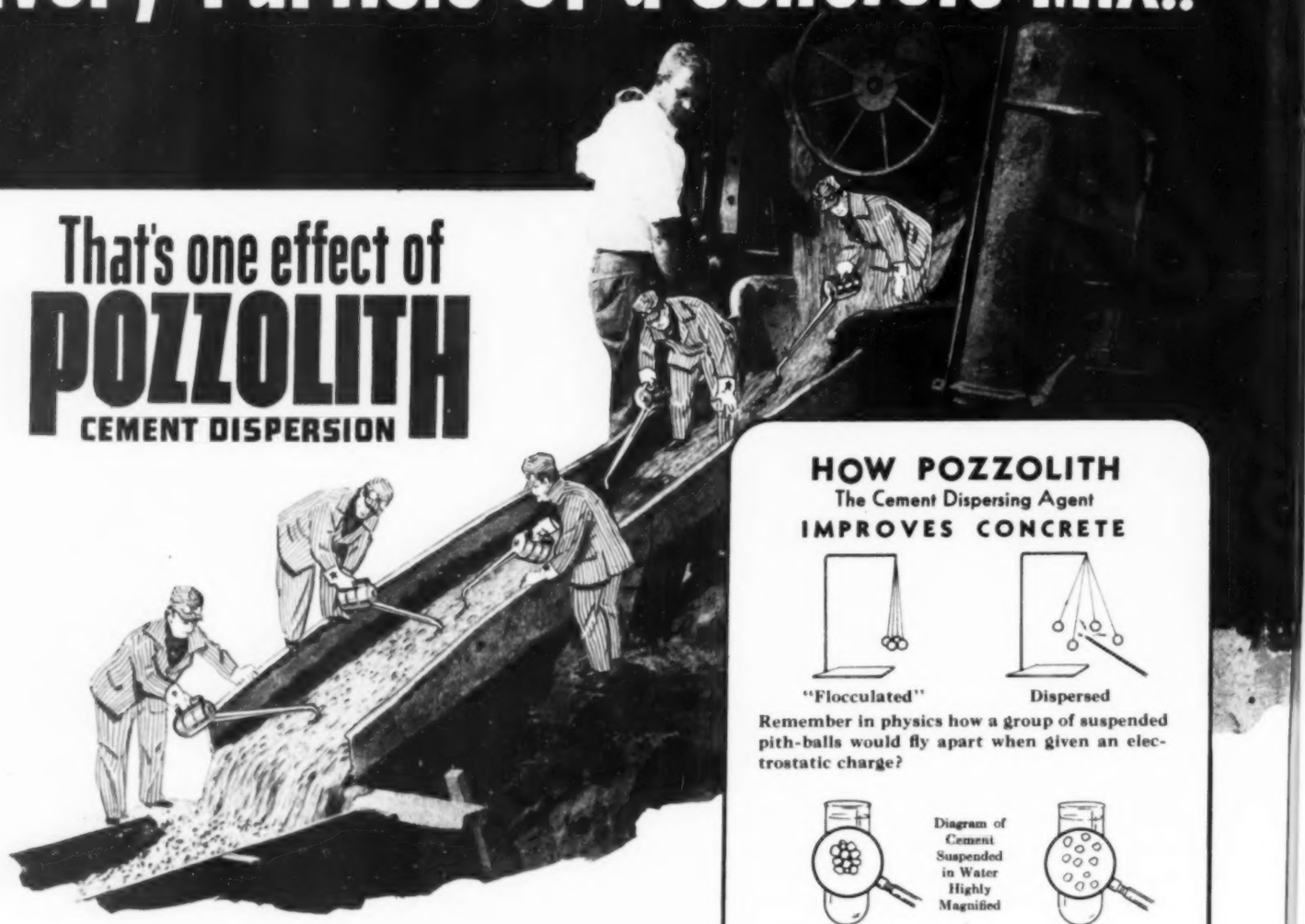
Please send me a copy of "Athey Care and Repair Tips," at no cost or obligation. (Print name and address carefully.)

Name_____

Address_____

City_____

# Imagine Every Particle of a Concrete Mix..



## That's one effect of POZZOLITH CEMENT DISPERSION

### HOW POZZOLITH
The Cement Dispersing Agent
### IMPROVES CONCRETE



"Flocculated" Dispersed

Remember in physics how a group of suspended pith-balls would fly apart when given an electrostatic charge?

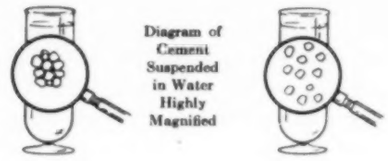


Diagram of Cement Suspended in Water Highly Magnified

Flocculated Dispersed

Similarly, cement particles which bunch together in water, or flocculate, are separated by this same electric force when Pozzolith is added to the mix. Thus greater cement surface area is made available to hydration, resulting in . . .

1. Putting more of the cement to work, by increasing the amount of hydration as much as 40%.
2. Increasing workability, producing up to 2½ times as much slump with the *same* amount of water.
3. Permitting up to 20% reduction in water, maintaining placeability . . . increasing strength . . . watertightness . . . and durability.

REPORTS from leading engineers and contractors emphasize the greatly improved placeability of Pozzolith concrete even after water has been reduced 15-20%.

Users say that this effect of "lubricating" a mix designed with a low water-cement ratio solves the problem of honeycombing. In addition to easier placing and less man-hours, Pozzolith insures greater watertightness and durability.

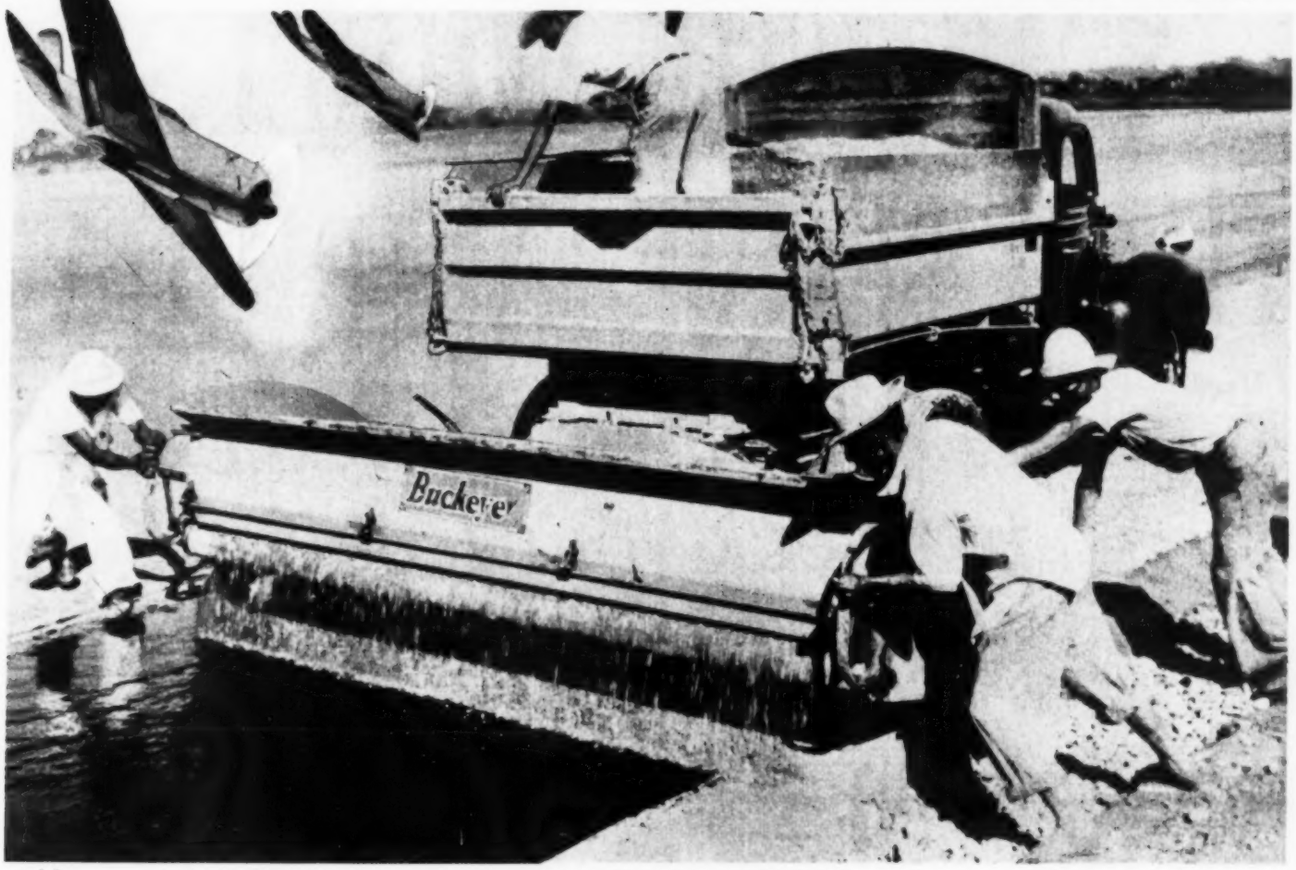
Write for complete information on Cement Dispersion and illustrated Pozzolith booklet.

**THE MASTER BUILDERS COMPANY**
CLEVELAND, OHIO TORONTO, ONTARIO

# MASTER BUILDERS

# Beating Schedules on the Ground

## ...to beat the Axis in the air!




## ...with Buckeye Spreaders

THE speed and accuracy of Buckeye Spreaders has helped surface many a runway at schedule-beating pace, extending the network of training, fighting and transport fields that will soon add up to overwhelming air superiority over the Axis.

Fast, accurate and versatile, Buckeye Spreaders deliver the *most* out of every precious hour, out of every yard of costly, hard-to-get material . . . *facts* that mean speed and efficiency on essential airport construction and maintenance jobs. Write or wire for complete information.

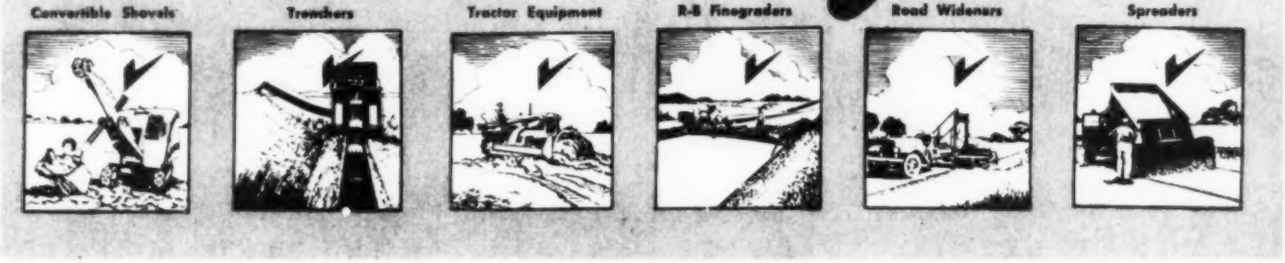
**The Buckeye Traction Ditcher Co.**
**Findlay • Ohio**

50 YEARS OF PROGRESS BUCKEYE

*PHOTO—Buckeye Spreader laying a chip course over oil base at one of Pan-American's new bases "out yonder".*

## Built by Buckeye

See our advertisement on pages 36 & 95



# "SAVE THE WHEELS THAT SERVE AMERICA"

## *Ask Your Chevrolet Dealer to check your truck*

SUPER CHEVROLET SERVICE

- ✓ *Check and rotate tires*
- ✓ *Check lubrication*
- ✓ *Check engine, carburetor, battery*
- ✓ *Check brakes*
- ✓ *Check steering and wheel alignment*
- ✓ *Check clutch, transmission, rear axle*

**Chevrolet dealers service *all* makes of trucks.**

**Chevrolet dealers have had the broadest experience—servicing millions of new and used vehicles.**

**Chevrolet dealers have skilled, trained mechanics.**

**Chevrolet dealers have modern tools and equipment.**

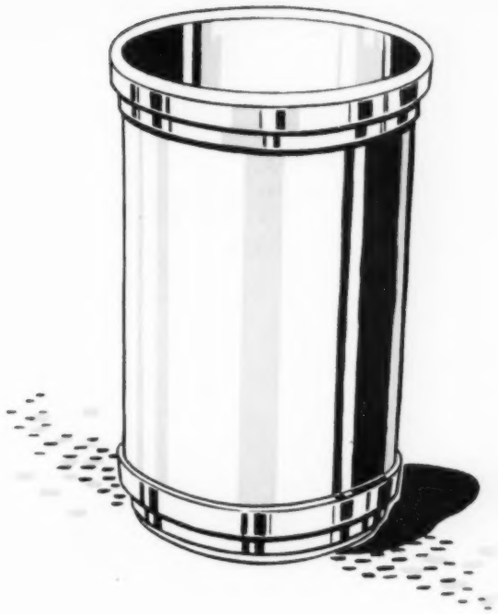
**Chevrolet dealers give quality service at low cost.**

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT, MICHIGAN

SEE YOUR LOCAL CHEVROLET DEALER TODAY

**HEADQUARTERS FOR SERVICE ON ALL MAKES AND MODELS**

You can buy a new tie in 3 minutes...



but it may take weeks to renew a scored cylinder

The answer is Preventive Maintenance now with Shell Diesel Lubricants

SHELL

When rings stick, allowing hot gases to blow-by the pistons, it's good-by cylinder liners and piston rings . . . parts you can't always get when you need them. Then, too, there's that matter of an idle piece of equipment while new parts are installed. Many of these time-wasting failures can be avoided by careful attention to lubrication.

In peacetime, Diesels were operated under more or less normal conditions. But today, engines are being worked harder and for longer, continuous periods of time. This means oil should be changed at more frequent intervals.

Yes, these more frequent changes do take time. But the few minutes they do take may save you days of delay later. Don't wait for a breakdown. Call in the Shell man now. Let him help you plan your Preventive Maintenance.

ARMY E NAVY

First oil refinery to win Army-Navy "E"— Shell's Wood River Refinery.

**SHELL DIESEL LUBRICANTS AND SHELL "DIESELINE"**

Airports

Highways

Buildings

# New PAVER VERSATILITY for tomorrow's Jobs!

THE old Third Avenue elevated becomes a highway of tomorrow—a modern four-lane elevated express highway that will speed motor traffic from New York City to South Brooklyn.

Now other municipalities with elevated structures are studying the costs of redesign and reconstruction for the day when steel is available again.

Ideas like this are only indications of the great mass of work that peace time needs are going to generate. For that time, there will be an improved MultiFoote, a paver proved in the "highball" service of war effort—a paver with new flexibility — a paver with an elevated boom capable of handling high output to elevated structures—and fast—a paver capable of more than roadwork only.

In the MultiFoote, you will have a machine that will make post-war contracts more successful in spite of the increased post-war competitive angle—and remember, there are more MultiFoote Pavers in service than any other make.

**THE FOOTE COMPANY, INC., Nunda, New York**

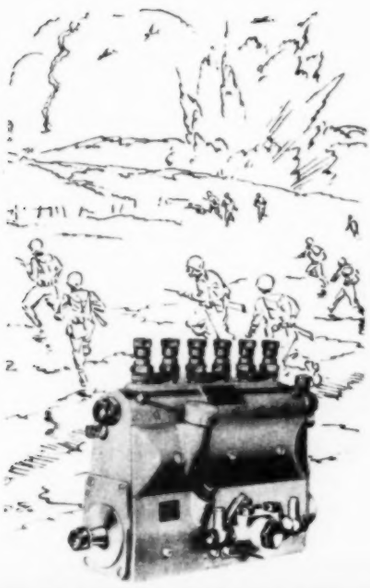
MultiFoote Paver placing concrete for the old Third Avenue Elevated, New York City.

MULTIFOOTE CONCRETE PAVERS

ADNUN BLACK TOP PAVER

Three years ago she was a school girl. Now she's a modern New England craftsman drilling holes .006" in diameter in fuel injection spray nozzles.
CHARLES LASALLE

# "Running as smooth as silk"



ZERO HOUR . . . no time now for tinkering . . . the landing boat's Diesels must not fail or falter. In a raid timed to the last minute, fighting men trust their lives to the quality of their equipment, confident that America's production men and women have done their part.

That confidence is well founded. At American Bosch, for example, increasing shipments of Diesel fuel injection pumps and spray nozzles pour forth to equip the engines of the United Nations. Turning out this equipment to tolerances measured in *millionths* of an inch are American Bosch *specialist* craftsmen . . . relative youngsters thoroughly qualified now—through engineering, planning, training, and tooling—to handle *few* jobs *extremely well.*

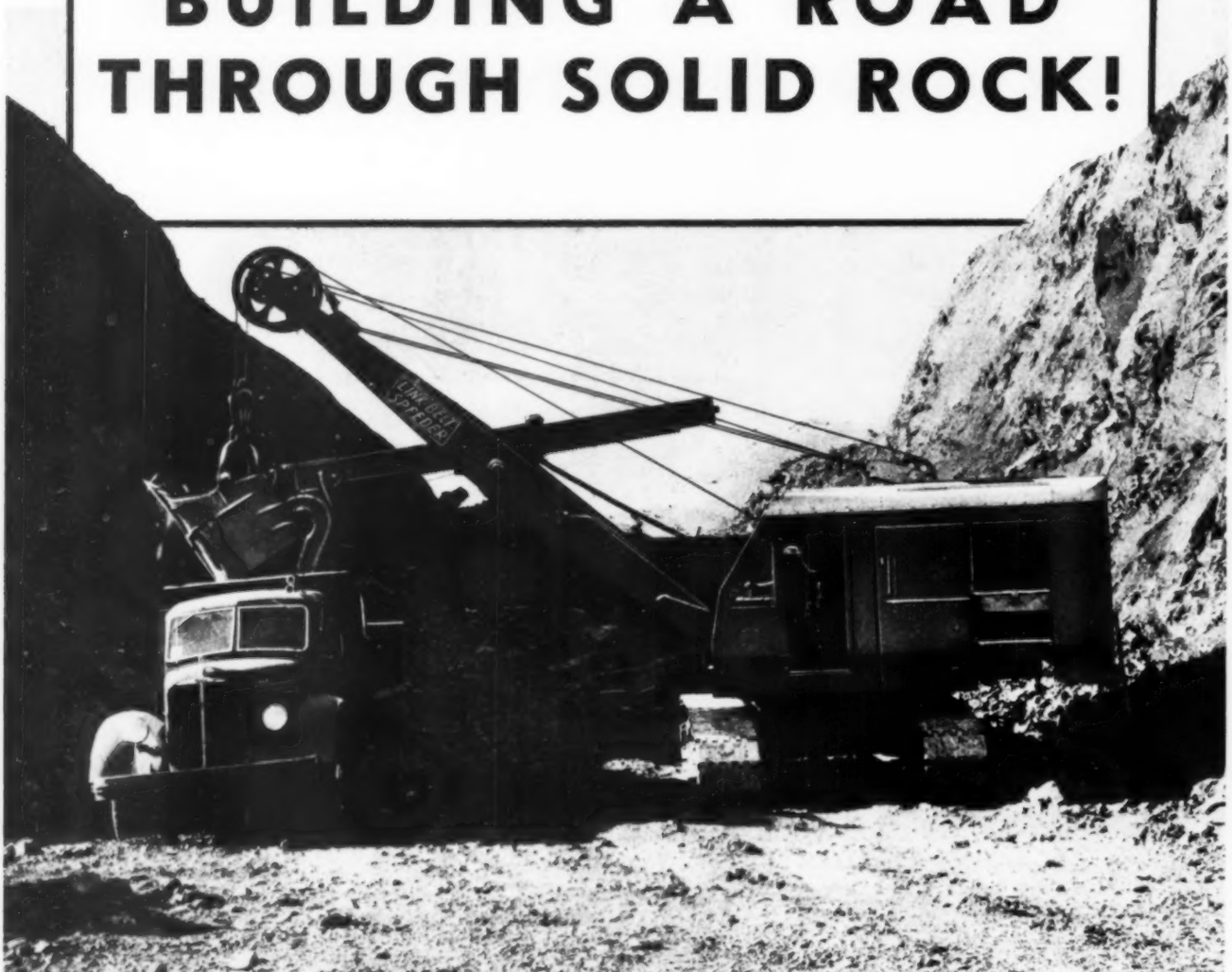
The same American Bosch engineering know-how that keeps our production line at top speed is also helping engine designers, manufacturers, users. In research, design, and production—war or peace—American Bosch serves all branches of the internal combustion engine industry. *American Bosch Corporation.*

## AMERICAN BOSCH

AVIATION AND AUTOMOTIVE ELECTRICAL PRODUCTS . . . FUEL INJECTION EQUIPMENT

MODERN CRAFTSMEN IN THE NEW ENGLAND TRADITION

# BUILDING A ROAD THROUGH SOLID ROCK!




**LINK-BELT SPEEDER** provides the necessary strength and stamina to provide an excellent performance record on this tough construction job near Monteur, Idaho. Highest slopes were nearly 900 feet above grade. Speed-O-Matic Hydraulic Power Control, greater stability and freedom from maintenance-delay or breakdown combine to provide day-after-day performance records with Link-Belt Speeder machines. They are engineered to provide constant, full-capacity operation quickly, efficiently and without delay.

9095

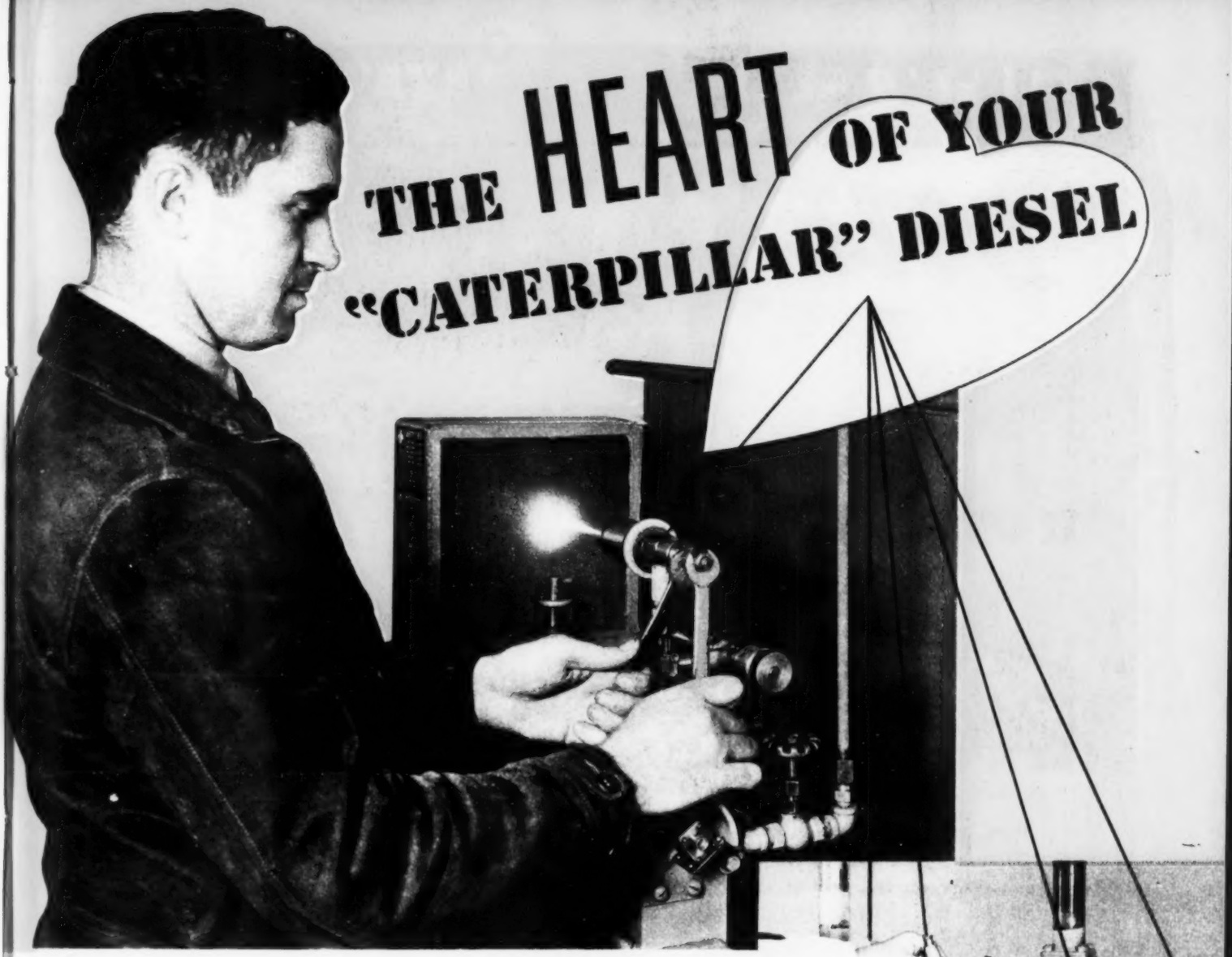
**LINK-BELT SPEEDER**

BUILDERS OF THE MOST COMPLETE LINE OF
SHOVELS—
CRANES—
DRAGLINES



LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)

# THE HEART OF YOUR "CATERPILLAR" DIESEL



WHAT makes your "Caterpillar" Diesel Engine "tick"? What gives it such outstanding power, flexibility, dependability and economy? Primarily it's the fuel injection system—vital *heart* of the engine.

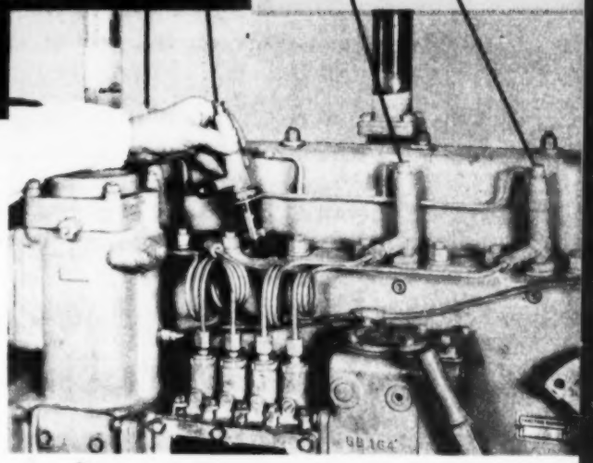
The "Caterpillar" fuel system is in many ways unique. It is simple and durable, yet made with greater precision than a fine watch. It is built to give long, satisfactory service without operating adjustment. But when fuel injection pumps and valves become worn, engine performance falls off.

Consulting your Operator's Instruction Book and following its directions will pay dividends by insuring the long life of your fuel injection equipment. Here are some reminders:

1. Buy clean fuel and keep it clean.

2. Watch the fuel filter. Its job is to keep all foreign matter out of the fuel. As soon as the pressure gauge indicates that the filter is clogged and the flow of fuel restricted, filter should be replaced.

3. If you believe the engine's fuel injection system is in need of any kind of attention, take it to your "Caterpillar" dealer for testing. He has special equipment that shows quickly whether anything is wrong.



*Removing a "Caterpillar" Fuel Injection Valve is a quick, easy job. Both valves and pumps are readily accessible and easily removed for an inspection and testing.*

In times like the present, when all the nation's horsepower is working longer and harder in the victory effort, you can rely on your "Caterpillar" dealer for expert help. He has dedicated his excellent repair facilities and mechanical skill to the task of keeping your "Caterpillar" Diesel equipment on the job, without waste of time or materials, until the final battle is won.

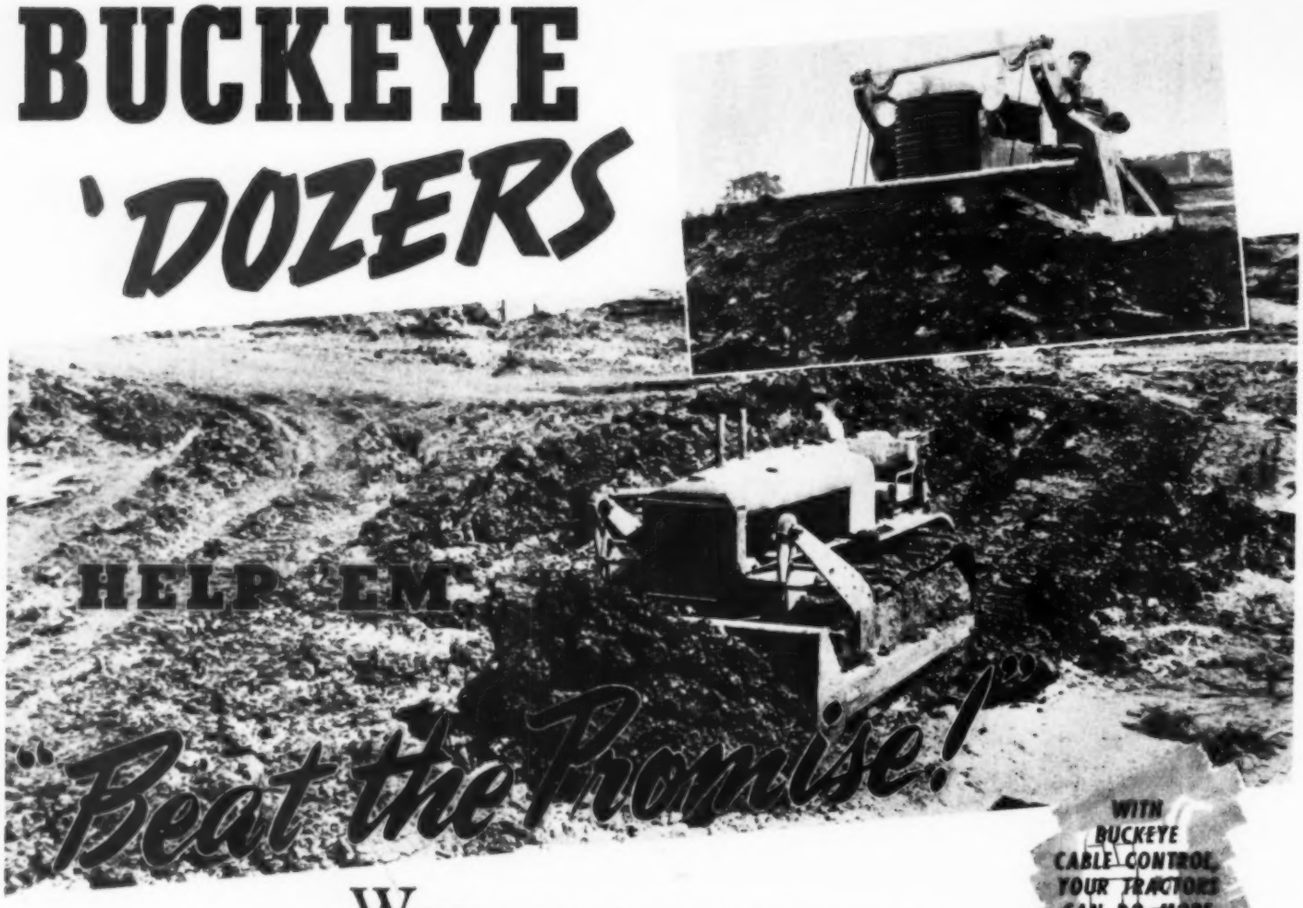
**CATERPILLAR DIESEL**

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

**TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!**

# BUCKEYE 'DOZERS




WITH BUCKEYE CABLE CONTROL YOUR TRACTORS CAN DO MORE JOBS!

WHERE speed and sustained high output is a *must*, you'll find fast-working Buckeye cable 'dozers hard at work. These output-makers have what it takes to deliver the *most* out of every hour on the job—accurate, lightning-fast cable control; balanced weight that helps, not hinders, tractive effort; scientific blade design to roll bigger-yardage loads and make it easier on the tractor—every practical feature you need in a 'dozer that can help you beat today's hurry-up schedules.

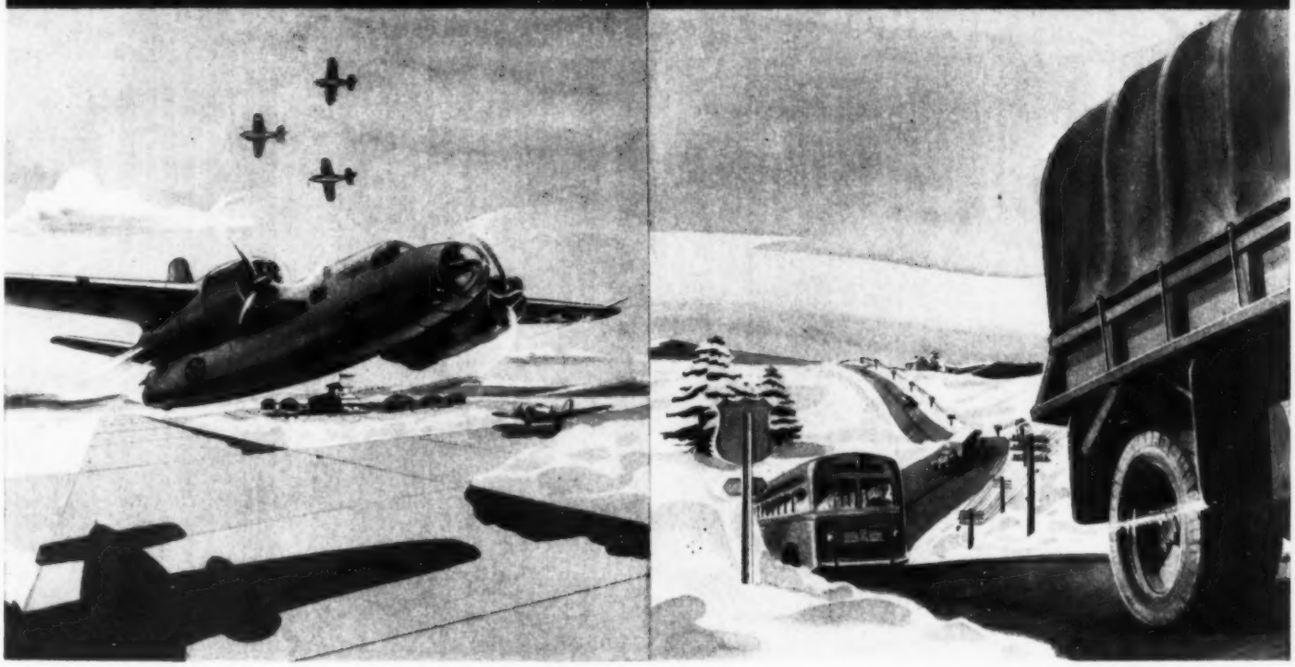
For real help on your tractor equipment problems, see your Buckeye distributor and get the *facts* about Buckeye Bulldozers, Trailbuilders and Power Control Winches.

**BUCKEYE TRACTION DITCHER CO., Findlay, Ohio**

See our advertisement on pages 29 & 95

## Built by Buckeye

**RUNWAYS!** **HIGHWAYS!**



# Clear of Snow...and SMOOTH!

EXPERIENCE over the last 5 years demonstrates that Vinsol-treated cement is an ideal cement for runways and highways, for use in foundation work, flood-wall construction and slip-form casting. Not only does it save time and money in placing, but it virtually eliminates scaling.

**VINSOL*-TREATED CEMENT RESISTS SCALING**

**Exhaustively Tested**

Convincing proof that Vinsol-treated cement resists surface scaling is established by experiences in many Northern States. For example: In several tests Vinsol-treated cement was laid side by side with normal portland cement. While the normal portland scaled right up to the joints, the Vinsol-treated cement remained in almost perfect condition, winter after winter, in spite of constant freezing, thawing, and the surface action of de-icing agents.

**Contractors Enthusiastic**

Another advantage of Vinsol-treated cement in its nationwide applications, is its superior workability. It is more plastic. There is less segregation of the aggregate; less tendency to form mortar pockets. It is easier to spread; faster to finish. As a result crews are able to work closer to the mixer, thus saving time and money.

**Vinsol-treated Cement Easy to Obtain**

You can probably get Vinsol-treated cement with full instructions for its use from your local supplier. We have a 44-page booklet, "Better Roads Ahead." You'll find it practical, instructive, well worth reading. Mail the coupon below for your copy.

*Reg. U. S. Pat. Off.

## Specify Vinsol-treated Cement for Longer Surface Life

NAVAL STORES DEPARTMENT
*HERCULES POWDER COMPANY*
INCORPORATED
974 MARKET ST., WILMINGTON, DELAWARE

Gentlemen:
Please send me a copy of 44-page book, Better Roads Ahead, telling the complete story of Vinsol-treated cement.

*Name*_____

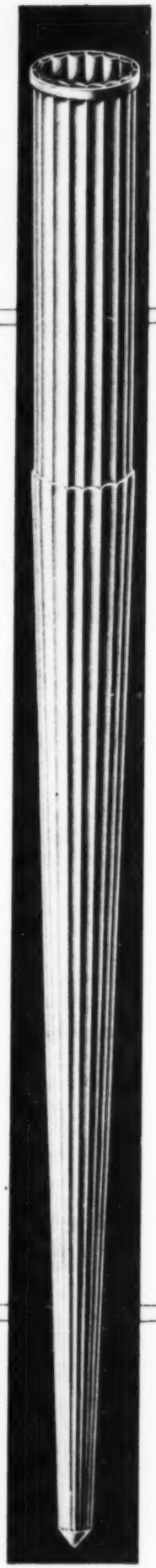
*Company*_____ *Title*_____

*Address*_____

*City*_____ *State*_____

LL-93

# MONOTUBES



## . . . GIVE YOU BETTER FOUNDATIONS IN LESS TIME AND AT LOW COST

Up against a tight production schedule? Troubled by low head room? Plagued by widely varying ground strata?

Solve all your problems at once with MONOTUBES—the streamlined, sturdy, fluted all-steel shells that many engineers consider best for cast-in-place concrete piling.

***EASILY HANDLED***—Monotube steel casings are light in weight, can be handled under any conditions quickly and economically.

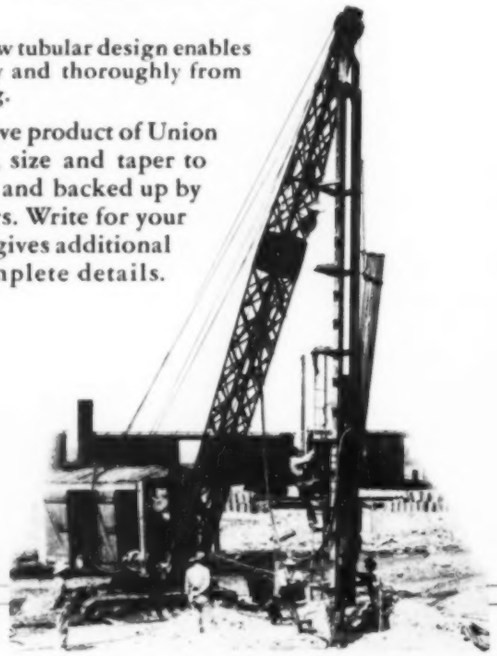
***QUICKLY DRIVEN***—Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment (crawler crane, equipped with standard leads and hammer).

***READILY EXTENDED***—Use of Extendible Monotubes proves economic and speedy where varying ground conditions require a wide variety of lengths. Extensive testing for lengths not necessary. "Cut-off" waste held to a minimum. Low head room no problem.

***SPEEDILY INSPECTED***—Hollow tubular design enables you to inspect casing quickly and thoroughly from top to toe before concreting.

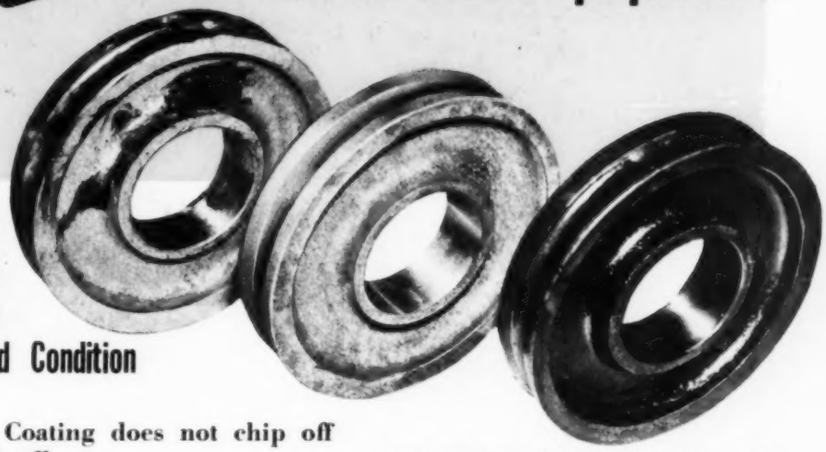
Monotubes are an exclusive product of Union Metal, available in a gauge, size and taper to meet all your requirements, and backed up by a reputation of over 36 years. Write for your copy of Catalog 68A which gives additional valuable information, complete details.

UNION METAL



## THE UNION METAL MANUFACTURING COMPANY
### CANTON, OHIO

# NOW— Rust-Resistant Parts for all LeTourneau Equipment



## Special Processing Protects Replacement Parts Against Rust and Corrosion During Shipment and Storage . . . Gives You Genuine Factory Parts in Factory-Finished Condition

### *Developed for Wartime Foreign Service — Now Available to All Users*

A special process for treating replacement parts for LeTourneau equipment has been installed to prevent rusting and corroding during months of exposure to salt air and arctic and tropical conditions encountered in shipments and storage of war supp s. This same protection is now given parts for all LeTourneau equipment, both domestic and export shipments . . . at no extra cost to you.

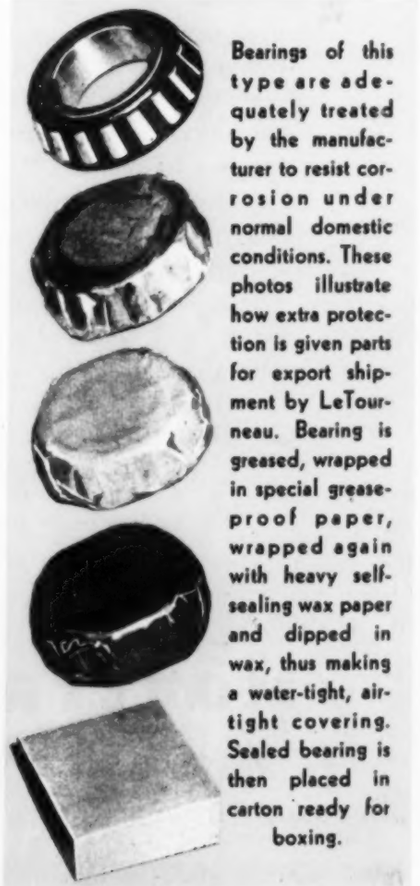
All machined parts first are thoroughly cleaned to remove all dirt and grease; then dipped in a special solution which gives a uniform, plastic-like coating to the entire surface of the parts. In tests this protective coating has resisted corrosion for 300 hours of exposure in salt spray. It is not sticky or greasy . . . thus, parts are easy to store and handle, do not collect dust and dirt. Coating does not chip off or rub off.

### *Saves You Time and Money*

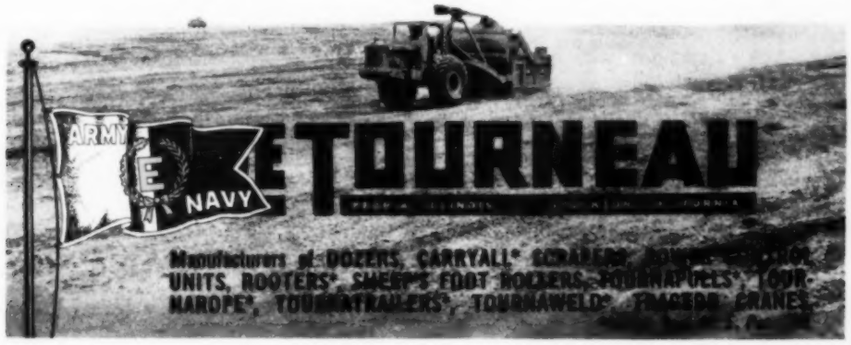
You save time and money when you get machined parts in good condition, free from rust, corrosion and grease . . . they are easier fitting, take less time and labor to fit . . . last longer because they're not damaged by corrosion . . . assure better equipment operation. The protective coating readily dissolves in oil and grease and has no harmful effect on the lubricating oil or grease used in LeTourneau equipment. If you prefer, the coating may be easily removed with fuel oil, gasoline, kerosene or lubricating oil before using the part.

Take advantage of this extra service . . . get rust-resistant parts for your LeTourneau equipment. Your LeTourneau-"Caterpillar" dealer's Victory Service Base is nearby . . . see him, now, for expert parts and repair service.

Machined sheave (above, left) is thoroughly washed . . . comes out free of grease and dirt (above, center) . . . is then dipped in special solution and dried giving a uniform, plastic-like coating (above, right) which prevents rusting and corrosion. Coated parts are placed in carton for protection against physical damage. On export shipments machined surfaces are further protected with water-tight, air-tight paper wrapping sealed with coat of wax.



Bearings of this type are adequately treated by the manufacturer to resist corrosion under normal domestic conditions. These photos illustrate how extra protection is given parts for export shipment by LeTourneau. Bearing is greased, wrapped in special grease-proof paper, wrapped again with heavy self-sealing wax paper and dipped in wax, thus making a water-tight, air-tight covering. Sealed bearing is then placed in carton ready for boxing.



*Placing Lateral Drain Pipe—Denison Dam, Denison, Texas — Contractor: Guy F. Atkinson Co., San Francisco, California.*

**TO KEEP THIS JOB DRY A MORETRENCH WELLPOINT SYSTEM PUMPED ABOUT 26 MILLION GALLONS OF WATER PER DAY!**

Power production at Denison Dam — Texas' $50,000,000 Flood Control and Power Project — is expected to start January 1, 1944 — *nine months ahead of the original program.* This announcement indicates in no uncertain terms the smooth and efficient handling of their contract by the Guy F. Atkinson Co.

One of the problems involved was the predraining of the excavation in the river bed, of the closure section of the dam, and the stabilization by predraining of the upstream cofferdam.

Moretrench engineers visited the site, designed the layout of the pumping equipment, and negotiated a contract with the Atkinson Co. Shipment and installation under Moretrench supervision followed on schedule.

RESULTS = DRY, SAFE, ECONOMICAL EXCAVATION in soils consisting of sand, clay and gravel 12′ to 21′ below water level.

*Competent engineering PLUS the best wellpoint equipment made enable us to guarantee results on any wet job. Save time and money on yours by installing a MORETRENCH WELLPOINT SYSTEM—first!*

# MORETRENCH CORPORATION

**90 WEST STREET, NEW YORK**

**ROCKAWAY, NEW JERSEY** **CHICAGO, ILLINOIS** **NEW ORLEANS, LOUISIANA**

# FEEDING SCRAP TO HUNGRY STEEL MILLS

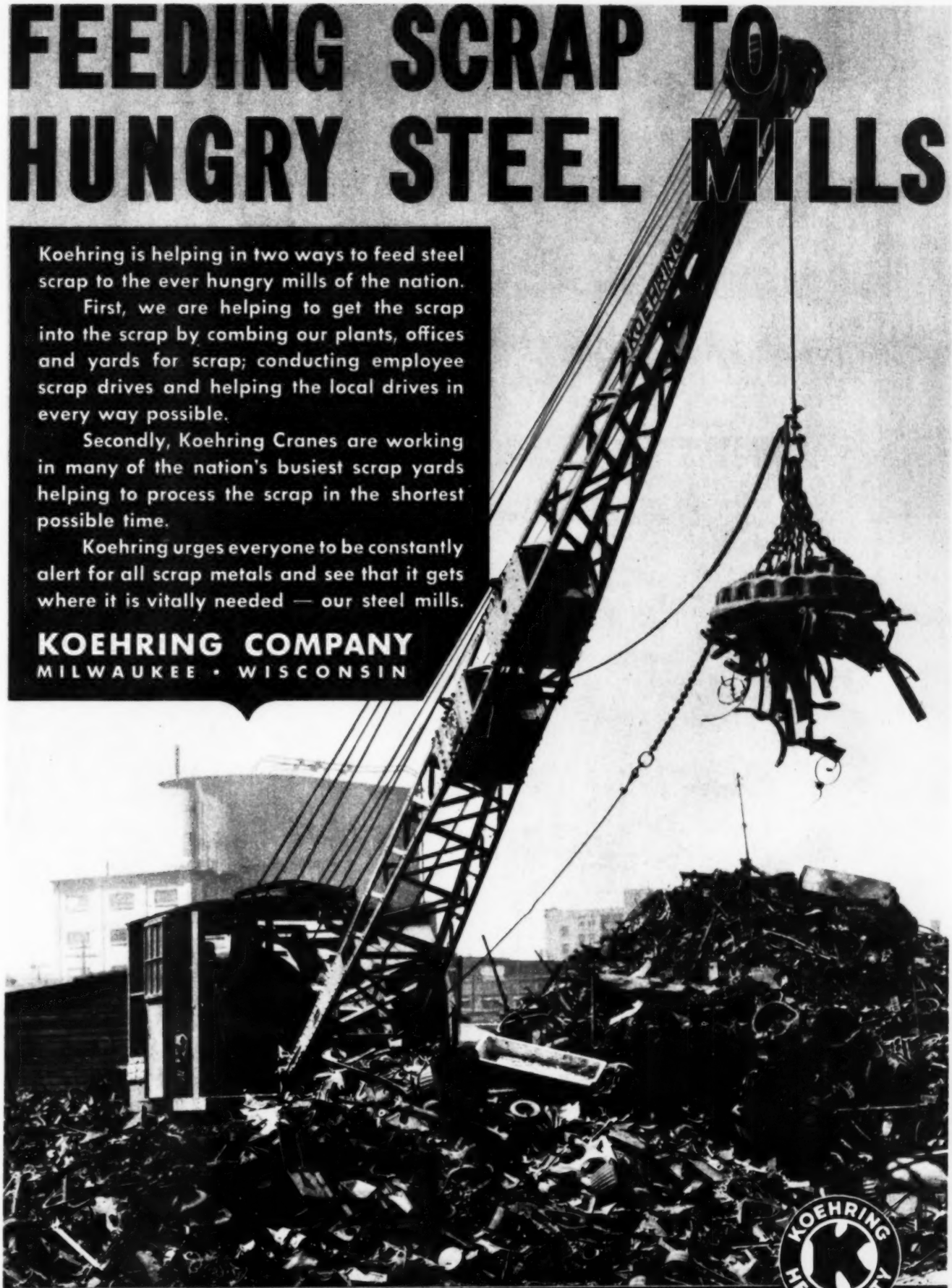
Koehring is helping in two ways to feed steel scrap to the ever hungry mills of the nation.

First, we are helping to get the scrap into the scrap by combing our plants, offices and yards for scrap; conducting employee scrap drives and helping the local drives in every way possible.

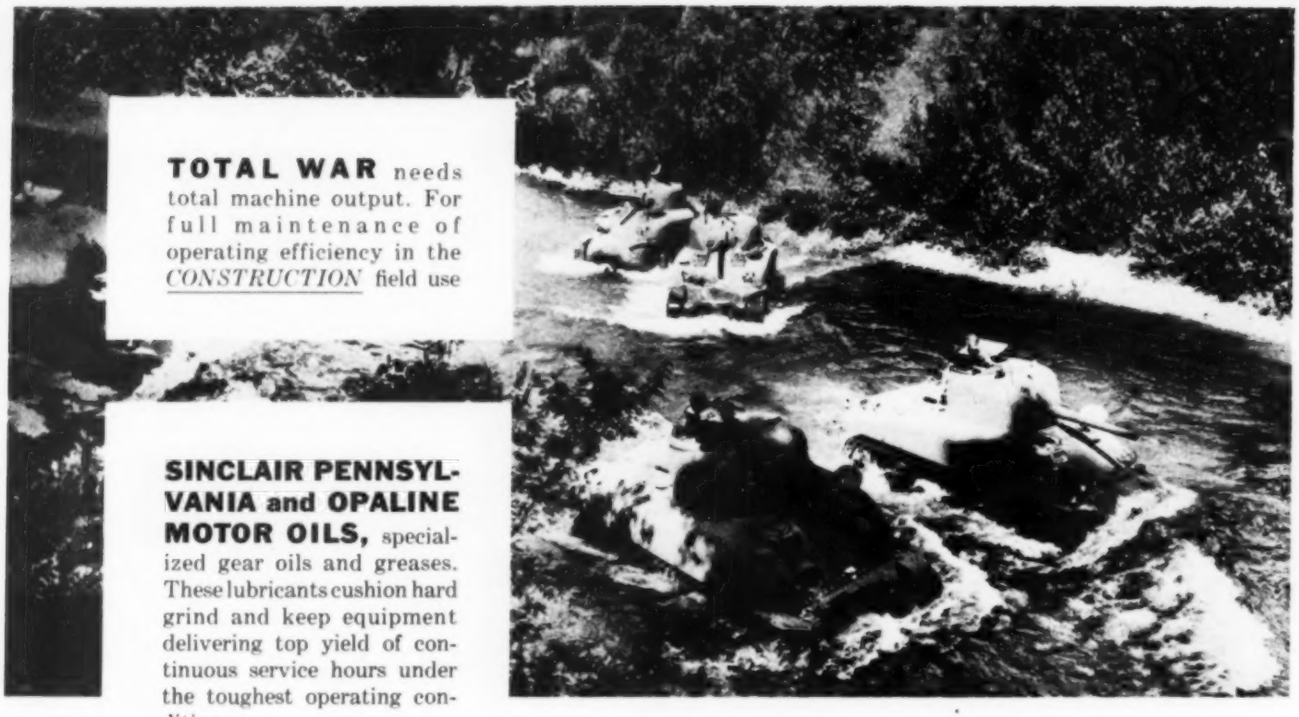
Secondly, Koehring Cranes are working in many of the nation's busiest scrap yards helping to process the scrap in the shortest possible time.

Koehring urges everyone to be constantly alert for all scrap metals and see that it gets where it is vitally needed — our steel mills.

**KOEHRING COMPANY**
MILWAUKEE • WISCONSIN




**HEAVY-DUTY CONSTRUCTION EQUIPMENT**



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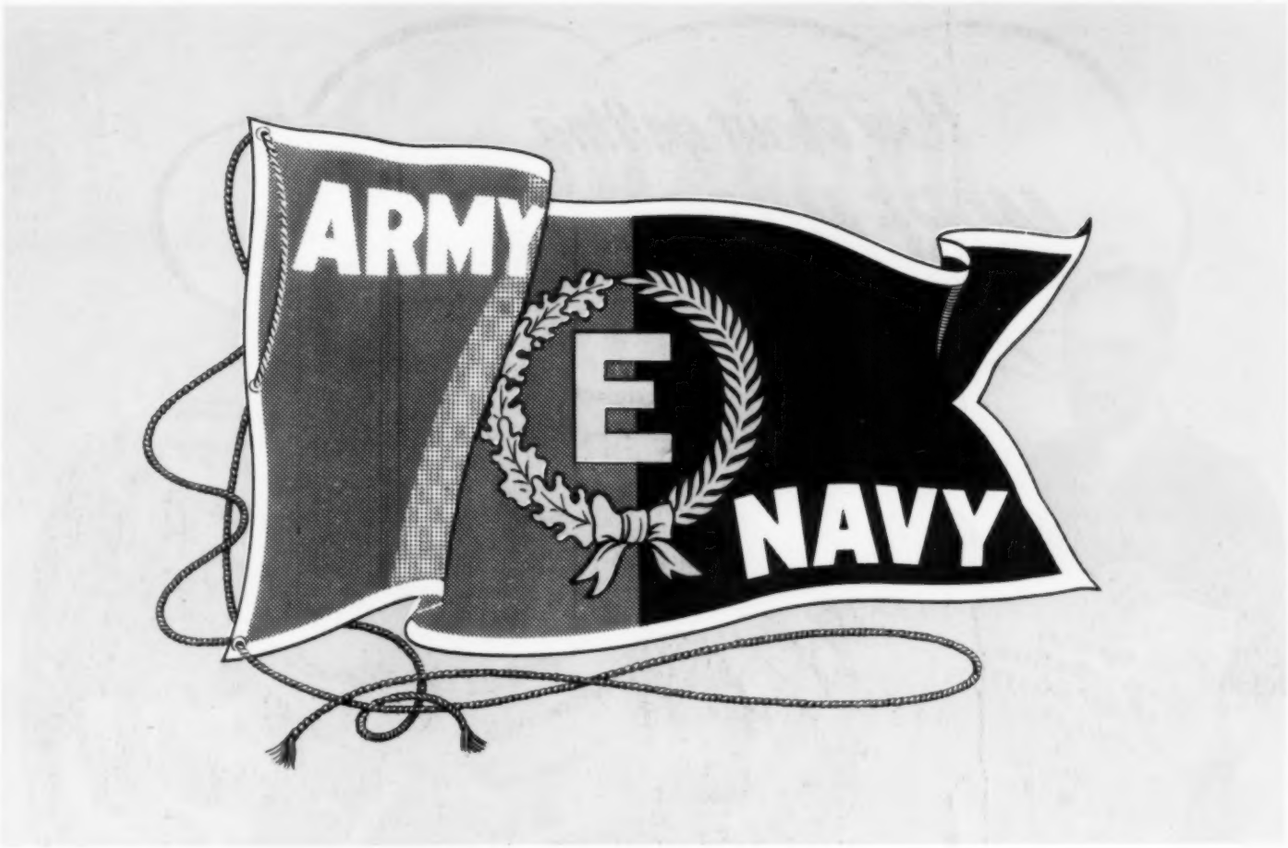


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"TO the men and women of the LaPlant-Choate organization whose hands, minds and energy have won this high honor, we say: 'Well Done'. Your high devotion to duty in your country's time of peril has won you the deep and lasting admiration of your fellowmen.

The Army-Navy 'E' is never lightly bestowed . . . it is awarded only to those with the courage and vision to face gigantic tasks and then to smash vigorously forward . . . to those who produce 'too much, too soon' instead of 'too little, too late'.

There is only one language Hitler and his kind understand . . . and you speak it well as you man your machines, smashing production record after production record.

The Army-Navy 'E' stands for efficiency. It is a symbol of an honor won and a new responsibility, too; but your past record shows you have what it takes to keep your 'E' pennant floating proudly over your plant until Victory is won!"

★ ★ ★

As we accept our "E" award, we want to proclaim publicly our appreciation of the valiant efforts of our materials suppliers without whose complete cooperation our job could not have been done.

And to our dealer-distributor organization in the field which has rendered, and will continue to render, yeoman service in keeping LaPlant-Choate equipment on the production front 24 hours a day, we express our deepest appreciation. Their efforts have, in large measure, been responsible for keeping LaPlant-Choate equipment "tops" on the job at all times!

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EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT

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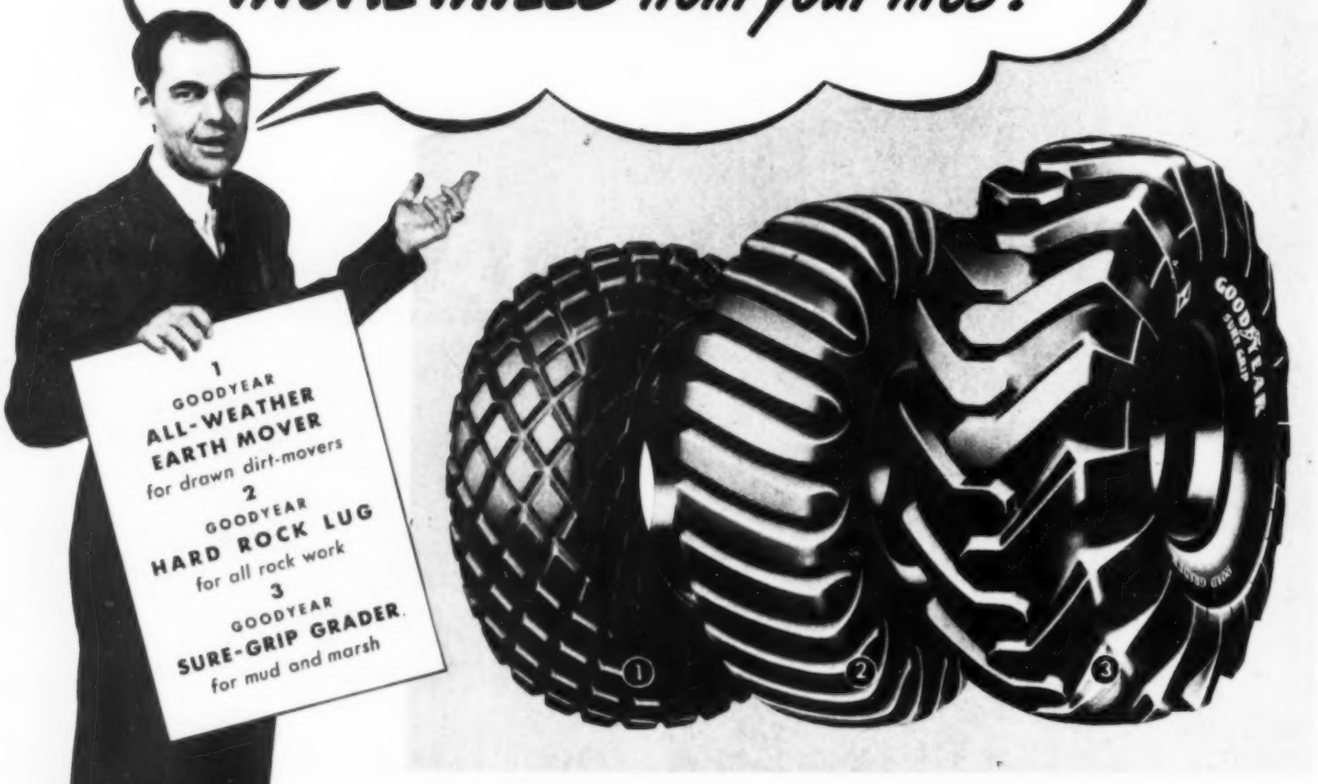


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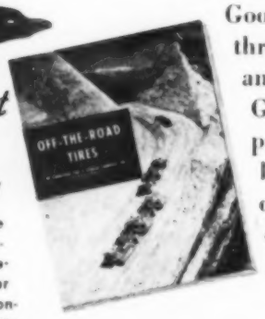
*Worth its weight in gold* →

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# GOODYEAR

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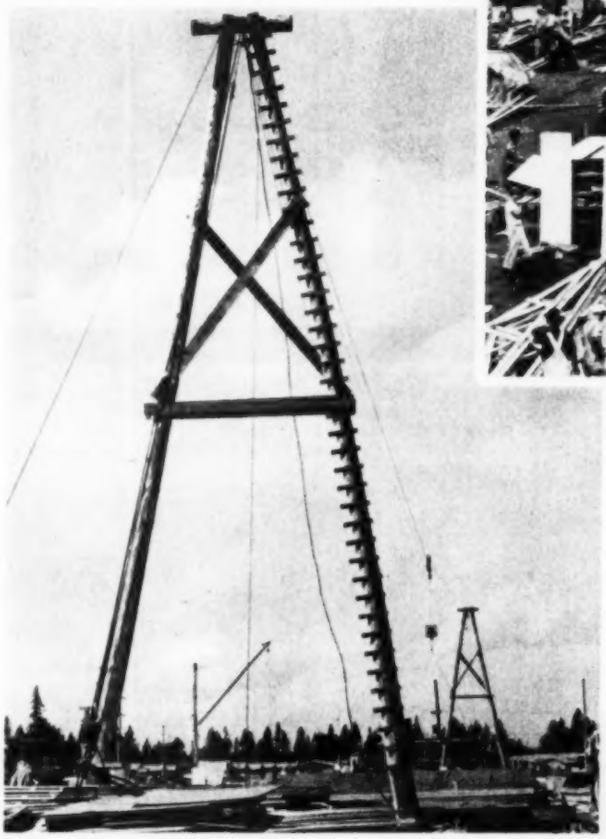
# Construction Methods

ROBERT K. TOMLIN, Editor

Volume 25 | APRIL, 1943 | Number 4

## *Highline Rig*

## Moves Prefabricated Units for Housing Project



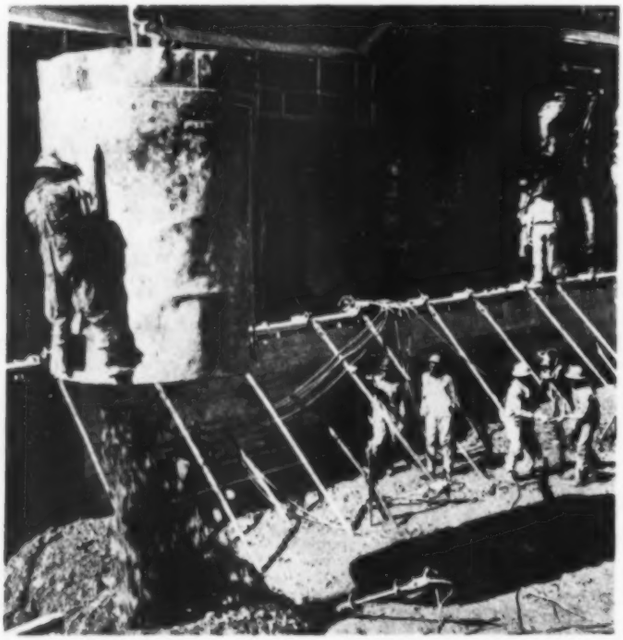
**ROOF AND CEILING ASSEMBLIES** are prefabricated in yard commanded by highline cableway of 400-ft. span.

**AN ADAPTATION OF EQUIPMENT AND METHODS** commonly associated with logging operations in the Pacific Northwest was made by the Haddock Construction Co., of Pasadena, Calif., in building a 5,242-unit housing project covering a 1,020-acre site at Vancouver, Wash. For handling prefabricated ceiling and roof assemblies the contractor installed a "highline," consisting of a pair of 50-ft. tall timber A-frames spaced 400 ft. apart and carrying a cableway. The highline cables lift the assemblies and deposit them, ceiling side down, in that portion of the storage yard where plywood roof sheathing is applied and wiring installed. The completed units then are loaded on trucks for delivery to the job site. The highline rig, according to members of the Haddock organization, effected a saving of several hundred men in the labor force required for the project.

**SCRAP FOR THE SCRAP,** is supplied by the ill-fated Tacoma Narrows Bridge, Washington, which collapsed Nov. 7, 1940. Demolition of structure yields 4,000 tons of No. 6 high-strength steel wire salvaged from the big suspension cables. Need of steel for war has made it expedient to proceed with dismantling now rather than to wait and include demolition in contract for erection of new bridge. Equipment designed of low priority material is unspinning main cables 24 at a time – rate that removed 100 tons per 8 hr. Demolition was carried out by Philip Murphy and Woodworth & Co. under cost-plus-fixed-fee contract starting Aug. 31, 1942 and to be completed about April 1 of this year.

Wide World Photo

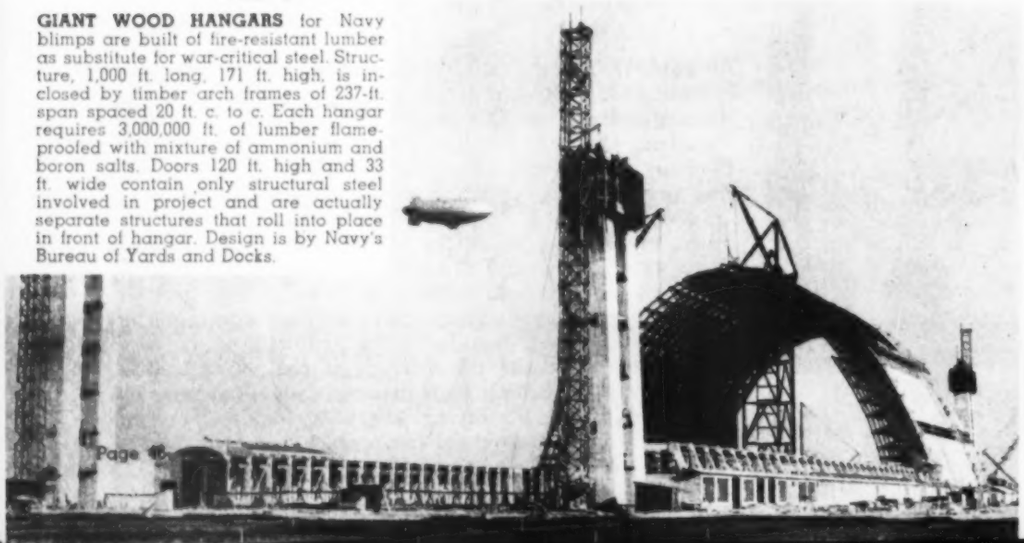
**VICTORY HUTS** of exterior grade Douglas fir plywood, sealed with Rezite plywood sealer to insure permanently uniform fit in any climate, are being manufactured by Texas Prefabricated House and Tent Co. for use of armed forces overseas. These square, hip-roof huts are each 16x16 ft. in plan; exterior walls are of 3/8-in. exterior plywood; roof has 1/4-in. exterior type plywood on both outside and inside, with insulation between. Hut floors, studs and rafters are of yellow pine and window flaps are 1/4-in. exterior plywood set in frames.

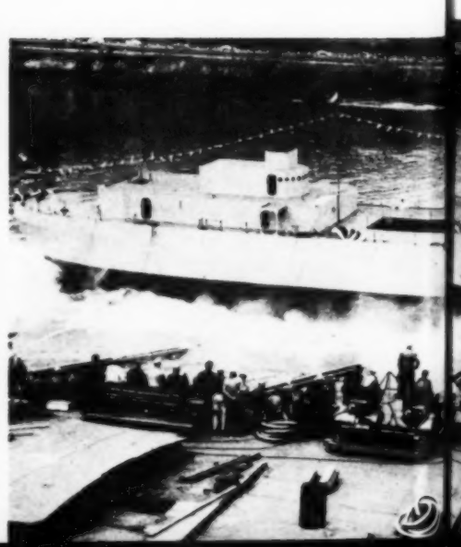


**POWER FOR WAR INDUSTRIES** will be furnished by TVA's Fort Loudoun Dam on Tennessee River. Mass concrete is dropping into forms from 3-cu.yd. manually operated bucket in second-stage spillway area. Mix is consolidated by vibrators. When completed the dam will be 135 ft. high and 3,900 ft. long.

# THIS MONTH'S NEWS REEL

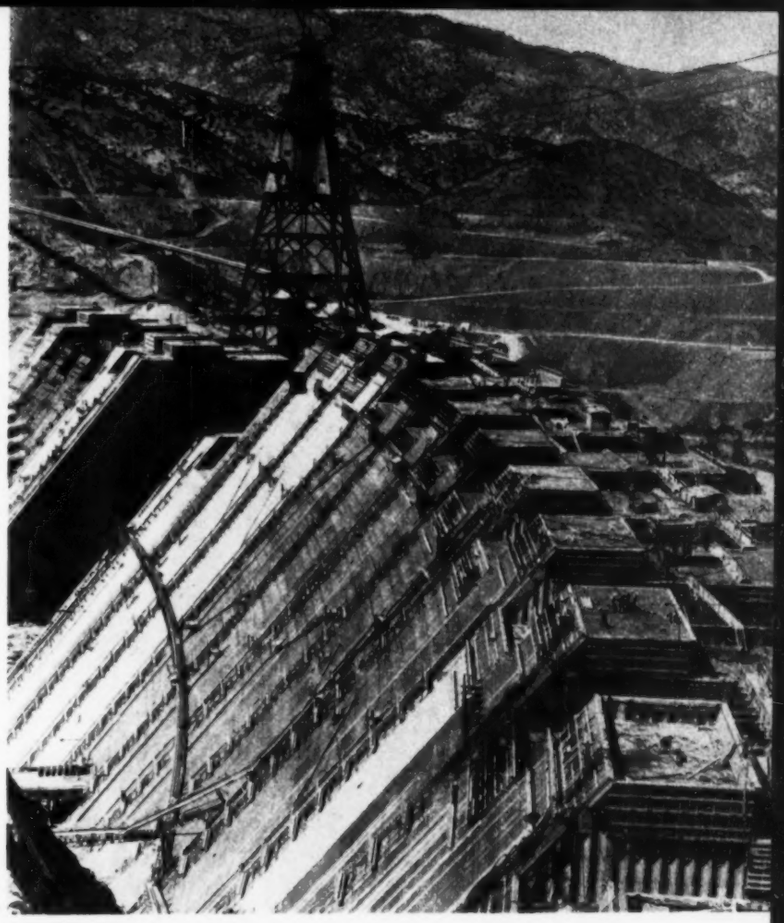
**GIANT WOOD HANGARS** for Navy blimps are built of fire-resistant lumber as substitute for war-critical steel. Structure, 1,000 ft. long, 171 ft. high, is inclosed by timber arch frames of 237-ft. span spaced 20 ft. c. to c. Each hangar requires 3,000,000 ft. of lumber flameproofed with mixture of ammonium and boron salts. Doors 120 ft. high and 33 ft. wide contain only structural steel involved in project and are actually separate structures that roll into place in front of hangar. Design is by Navy's Bureau of Yards and Docks.





**CLEARED TAKEOFF STRIP** in East African forest near Mt. Kenya, enables stranded R.A.F. plane, after forced landing, to take to the air and regain its base. Job required months' work by 150 natives. Cleared strip at left is narrow road cut to bring plane from mountain to runway.

Press Association Photo

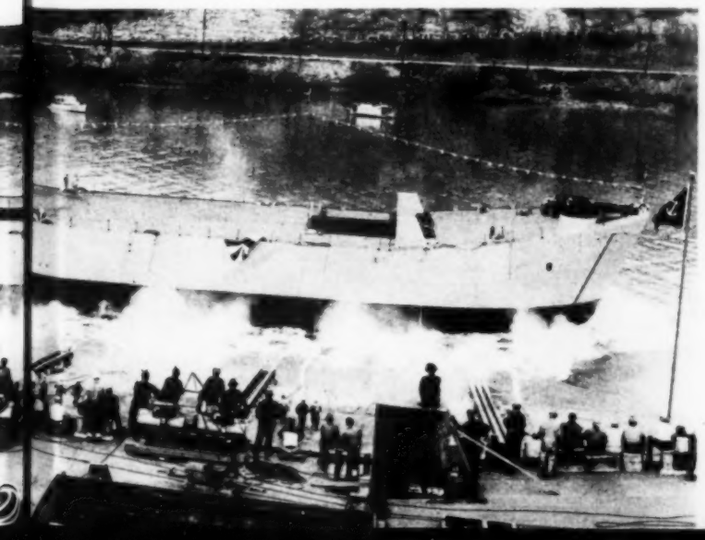


**DAY AND NIGHT CONSTRUCTION** at Shasta Dam by Pacific Constructors, Inc., adds about 200,000 cu.yd. of concrete per month to this U. S. Bureau of Reclamation project in California, which will produce power for northern and central California war industries and for controlled water in Central Valley. Some of massive concrete blocks in which main body of dam is cast, are within 75 ft. of their ultimate height of 602 ft.

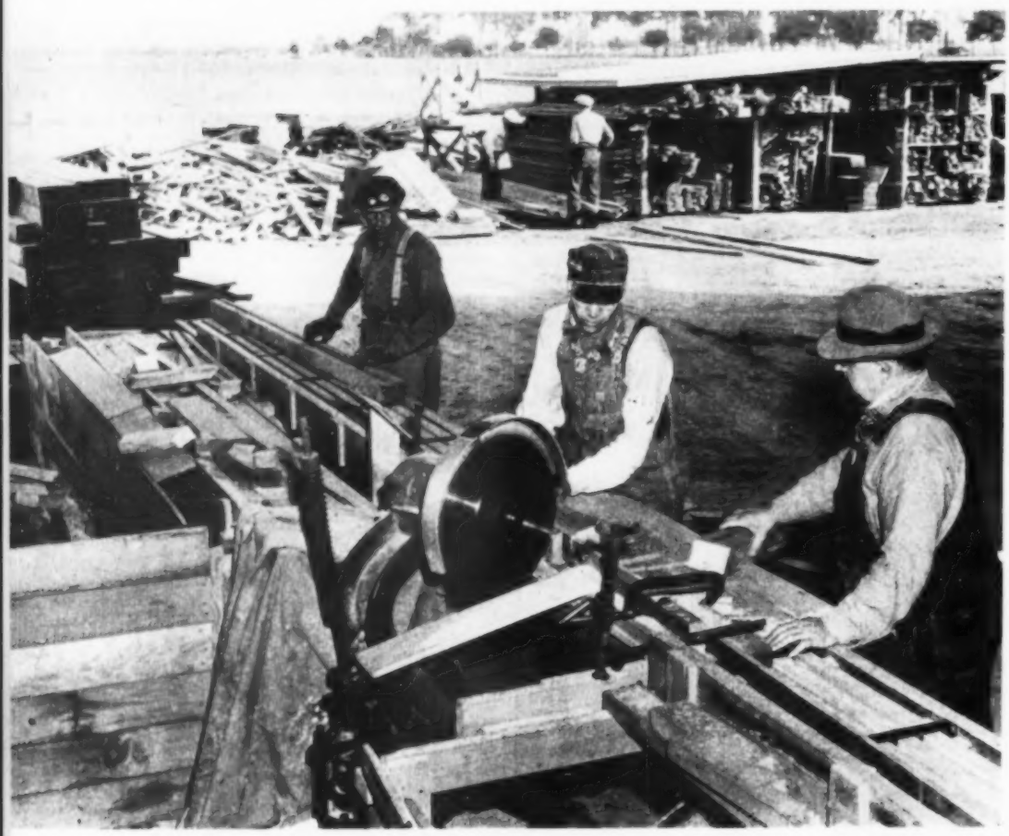
**EMERGENCY LANDING FIELDS (below)** for U. S. Army Air Forces in southwest Pacific are constructed in matter of hours with native labor by use of prefabricated Marsden steel mats. Graded field with crushed coral foundation is surfaced with perforated interlocking metal sections.

British Combine Photo

**SIDE LAUNCHING (below),** instead of end launching, is method employed by Dravo Corp., of Pittsburgh, Pa., to transfer from its yards to inland waters LST (landing ship for tanks) for Navy Department, from which an "E" Award was received for meritorious war production. These ships are built of preassembled sections on production line plan which permits simultaneous construction of number of hulls.



# *Pre-cut and Packaged Lumber* IS KEY TO



**THIS 18-IN. FOOT-OPERATED SAW** (Irvington Machine Works) was designed for operation only at fixed angle to cutting bench. However, base was rebuilt on job with graduated, rotating mounting that can be set at any desired angle to bench. When lumber to be cut is in place, foot treadle brings saw forward into cutting position. It backs away automatically when foot pressure is released.

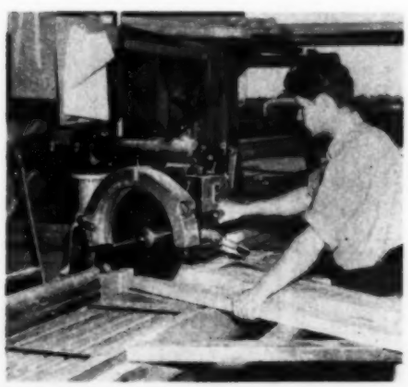
**DOUBLE-END TRIM SAW (below)** with automatic feed (Gordon Hollow-Blast Grate Co.) cuts lumber fast enough to make it economical to save short pieces. In this saw, two 18-in. blades slide along drive shaft and can be set at any spacing up to 28-ft. separation.

**THE FIRST UNIT** of a $15,000,000 project to build attractive homes for 2,500 families in a rapidly developing industrial district of southern California was begun in the fall of 1941 in the Lakewood City project at Long Beach, Calif. The initial contract for 585 houses, on which construction schedules called for completion in five months, was finished early last year. Additional units planned are contingent on the availability of certain critical materials.

Although precutting and prefabrication have become accepted practice for modern mass housing projects, in some respects this phase of the work at Lakewood City has set a new standard. Only by an unusually high degree of standardization, which permitted practically all shaping and cutting to be done in a mill area whence packaged materials are sent to each house, has it been possible to build modern, attractive homes that could be sold for $3,900 to $5,400. These are two- and three-bedroom houses with two baths, two-car garage, 55x110-ft. lot and including all utilities ready to

**QUANTITIES OF MATERIALS USED IN 585 HOUSES AT LAKEWOOD CITY, CALIF.**

| | |
|---|---|
| Concrete | 10,000 cu. yd |
| Lumber | 5,000,000 fbm. |
| Plastering | 650,000 sq. yd. |
| Shingling | 10,025 squares |
| Hand rived shakes | 150,000 |
| Bricks | 336,000 |
| Excavation | 11,500 cu. yd. |
| Street paving | 950,000 sq. ft. |
| Monolithic sidewalk | 175,000 sq. ft. |
| Curbs | 45,000 linear ft. |
| Asphaltic paving (drives, paths, etc.) | 415,000 sq. ft. |



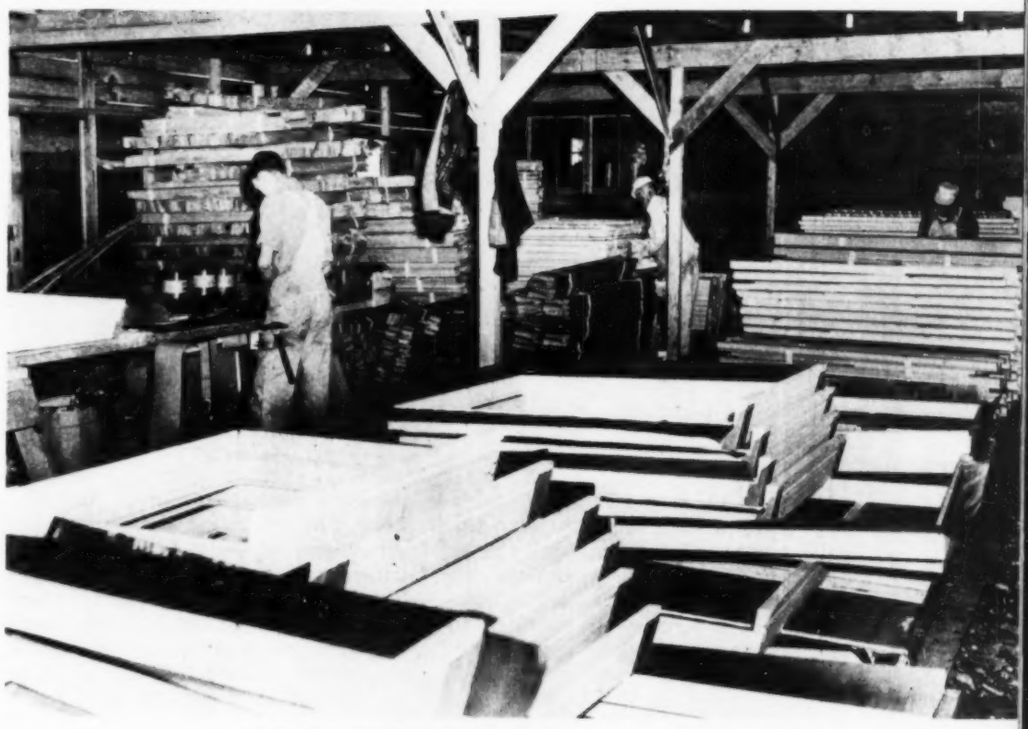
**HAND-OPERATED SAW** (18-in. Comet) is general utility tool, largely used on cutting rafters.

# TO HIGH-SPEED COMPLETION OF 585 HOMES

move in, with lawns and landscaping complete.

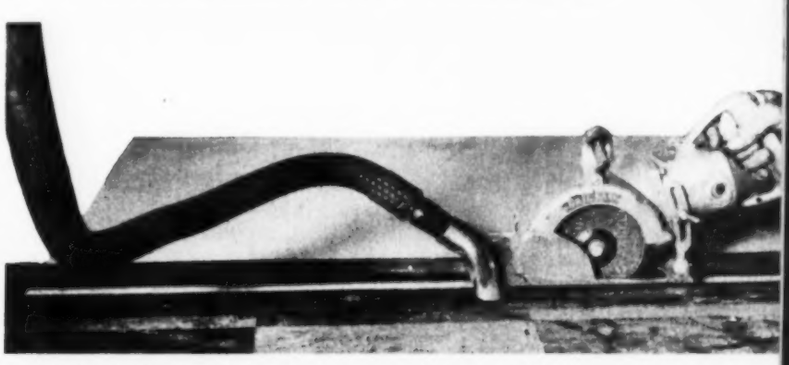
The high degree of standardization, however, does not mean sameness or even similarity in architectural treatment. There are seven different floor plans which were adapted to 35 variations in relative positions of rooms, architectural treatment, type of roof and exterior finish. For example, the finish may be stucco, rustic, hand rived shakes, brick veneer or numerous combinations of these different types. No two homes look alike. The set-back distance for houses at street corners is less than for houses in the middle of the block, thus greatly improving the perspective and giving a pleasing curve to the line of buildings in each street.

Careful attention was given to laying out the mill and materials yard where the precutting and assembling was done. Operations were departmentalized. The plumbing shop was arranged with ample bench space for daily completion of the required number of plumbing unit assemblies. In the linoleum shed, a wide workbench



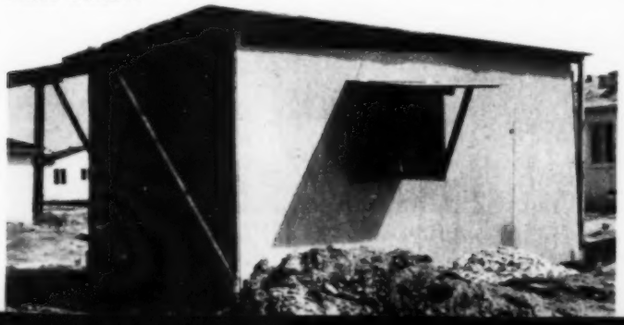
**DOOR AND WINDOW FRAMES,** shipped from factory in bundles of precut stock, are being assembled with copper-coated paper in joints.

**THREE MEN RESPONSIBLE** for progress on Lakewood City project are, left to right: C. F. HERZIGER, project manager; HARRY L. BRITTAIN, in charge of purchasing and coordination; WILLIAM STEARNS, general foreman.

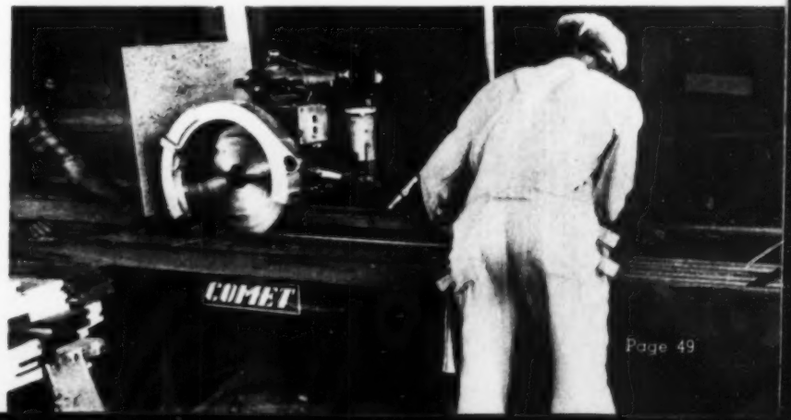


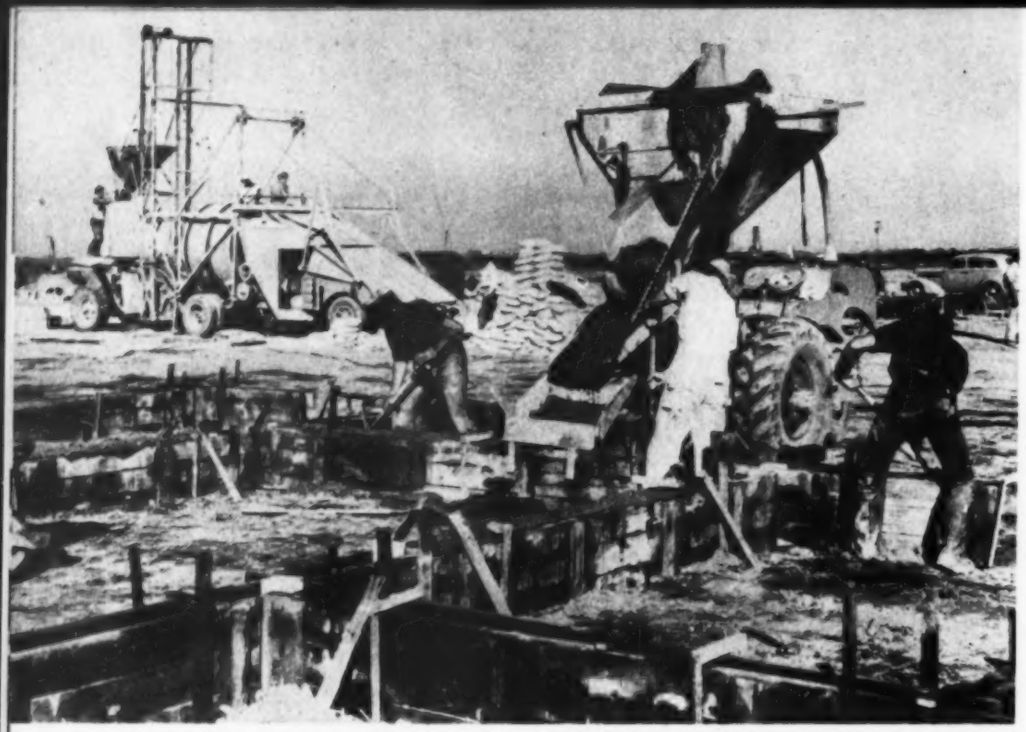
**VACUUM NOZZLE** is attached to forward end of guard of Skilsaw which cuts plastic on bench in linoleum shop. Here enamel board and other surfacings used in bathrooms and kitchens are cut to specification. Cutter is thin carborundum disk.

**FIELD MILL (below),** a 14x16-ft. house mounted on skids, is moved about job as needed. Two men stationed here do all trim cutting required for ten or twelve houses per day. Note hinged support for wall panel that swings upward to give easy access. Similar panel on opposite side permits running long pieces through circular saw mounted inside window.



**FOR RIPPING** dimension lumber **(below)** this 18-in Comet saw is used.





**CONCRETE MIXING OUTFIT** is moved to central locations on project and concrete is delivered to forms by 1-cu.yd. Buggymobile.

was provided, long enough to enable each shift to turn out more than the daily requirement of linoleum, plastic and other hard finish materials cut to the exact size and shape required so that each piece could be fitted to place with a minimum of assembly time.

A prerequisite to this factory-built-unit program was the preliminary work done on the seven basic floor plans and their 35 variations. For each of the floor plans, a complete set of templates (made of ¾x3-in. stock) were cut, marked and laid out on the mill floor where they served as the basis for an all-inclusive bill of material for each structure separated as to component parts that are switched in the variations. On these templates were marked (and the marks were made permanent by being cut into the wood) each wall opening that would be required for utilities, cabinets, windows and doors. Window openings were designated by letters and door openings by numbers. Only outlets from bathtubs and toilets (which go through floors and not walls) were exceptions to the rule that every utility and fixture had its exact location prescribed by a mark on the template.

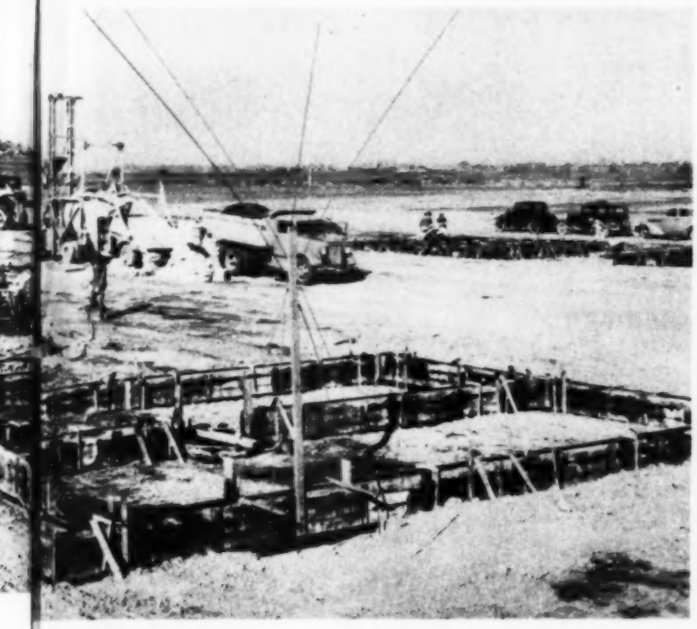
Thus it was possible not only to make up a bill of material and to order and cut each piece in advance, but the pieces needed for each item could be bundled for convenience in handling and marked for exact destination. With this system, delivery of materials was speeded and actual construction at the site became merely a process of putting together parts of assemblies that fitted exactly into prescribed locations.

In making up the crews that specialized on each phase of the construction and followed one another in a steady stream over the job, the objective was to put just enough men on each crew to keep ahead of the next succeeding crew, thus establishing a standard of daily production. Each workman was assigned a certain operation which he performed repeatedly until he could be expected to work with the speed and skill of a specialist.

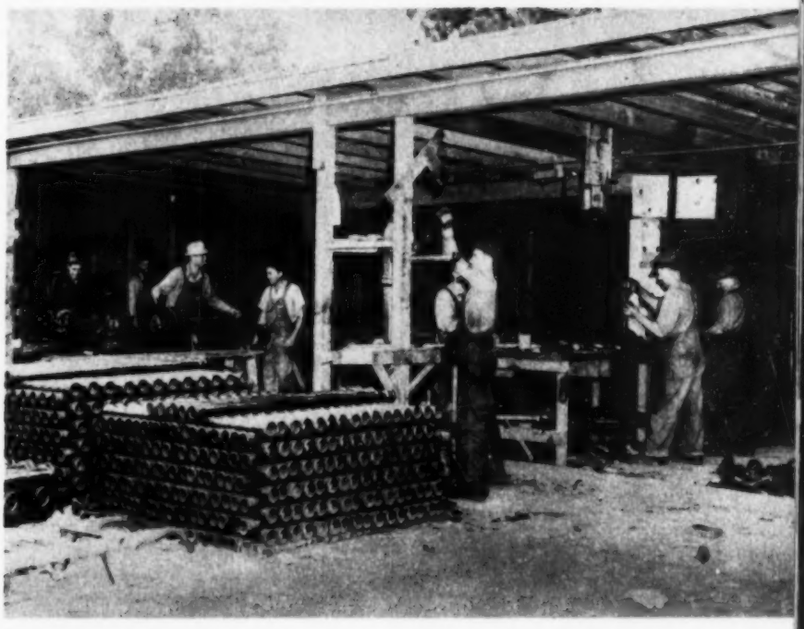
The first crew on the job set concrete forms, poured concrete and completed foundations up to the subfloor level (2x8 forms were used which, with frequent oilings, served for an average of 30 set-ups). A separate crew poured porches and garage floors (two crews were used on concrete because of the need for thoroughly wetting down and hand-tamping the

*(Continued on page 116)*

**BATCHING PLANT,** with storage capacity of 100 cu.yd. is used for delivering batches complete with water to truck-mounted mixers or dry batches to dump-trucks with batch compartments.



**DRY BATCHES,** sand and aggregate only, are brought to mixer in dump-trucks. Long steel rods in foreground are reinforcing for brick chimney.



**IN PLUMBER'S SHED** assemblies are made up to be delivered to houses as completed units.

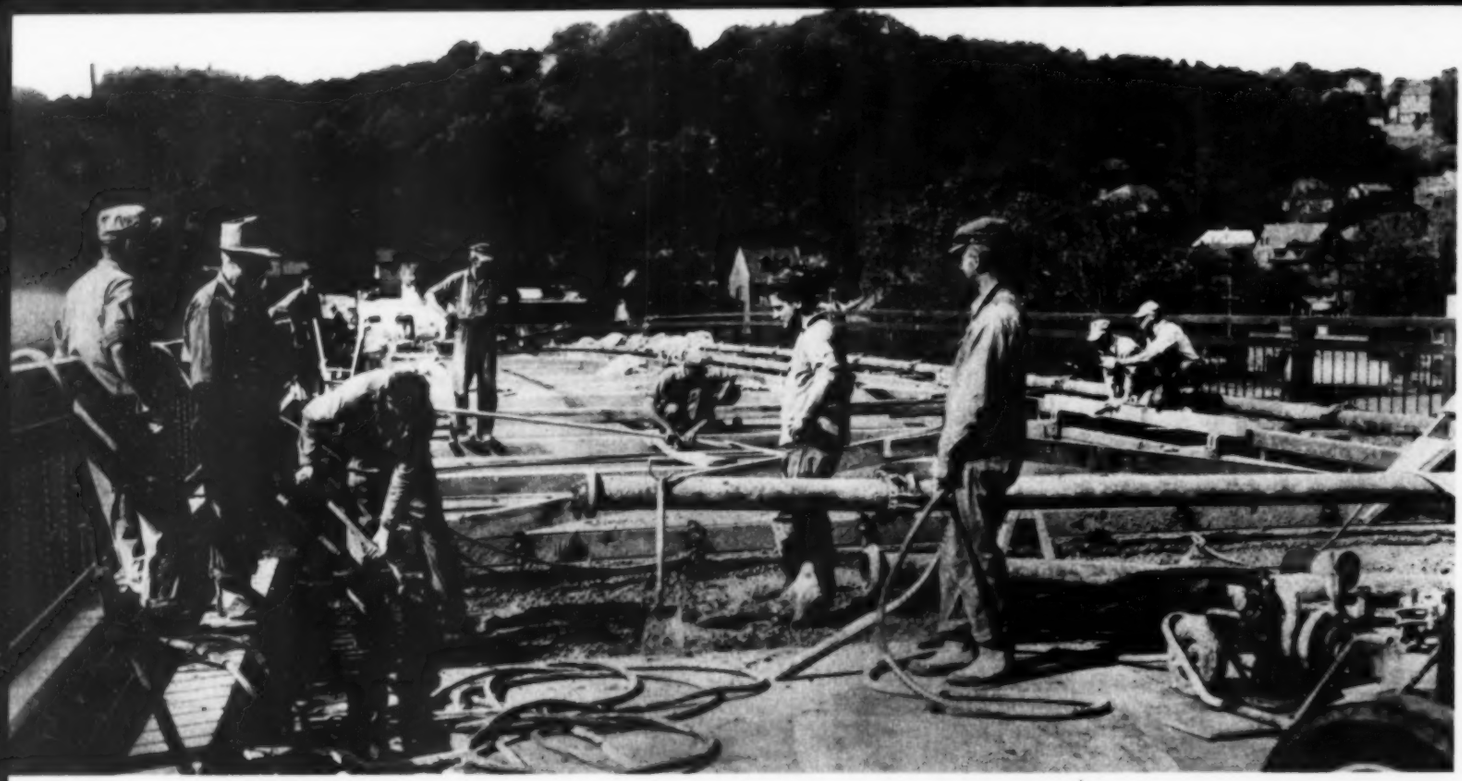
**EQUIPMENT USED ON LAKEWOOD CITY HOUSING PROJECT**

- 1 Gerlinger lumber carrier
- 1 Pacific lumber carrier
- 3 1-cu.yd. buggymobiles
- 5 4-cu.yd. transit-mix trucks
- 9 Flat-bed trucks (Dodge, Chevrolet, Ford)
- 3 Pick-up trucks
- 15 Power-driven Stanley hand saws (for cutting flooring and roof sheathing in place)
- 2 Stanley electric hammers
- 6 Stanley electric drills
- 1 Walker-Turner table saw (exterior trim)
- 1 Davis band saw (exterior trim)
- 1 Irvington Machine Works, automatic, 16-in. saw (5-hp. motor)
- 1 Comet 18-in. circular saw (7½-hp. motor)
- 1 Double-end, 18-in. circular saw (15 hp. motor) (Hollow-Blast Grate Co.— automatic feed)
- Portable mill { shaper, band saw } Walker-Turner; miter saw — De Walt

**AFTER GENERAL CLEANUP** with carryall and tractor **(right),** final smoothing off is done with this "Jeep", more properly described as Ferguson-system Ford, trailing small scraper. This unit does excellent job of smooth surface finishing prior to placement of top soil and landscaping.

**UTILITIES ARE LAID (below)** ahead of sidewalks and curbs. Street grading comes next. House walks, sprinkler systems and planting precede occupancy by new owner.

**WALL CREWS (below)** are just starting work on buildings in center; walls have been completed on buildings at left.

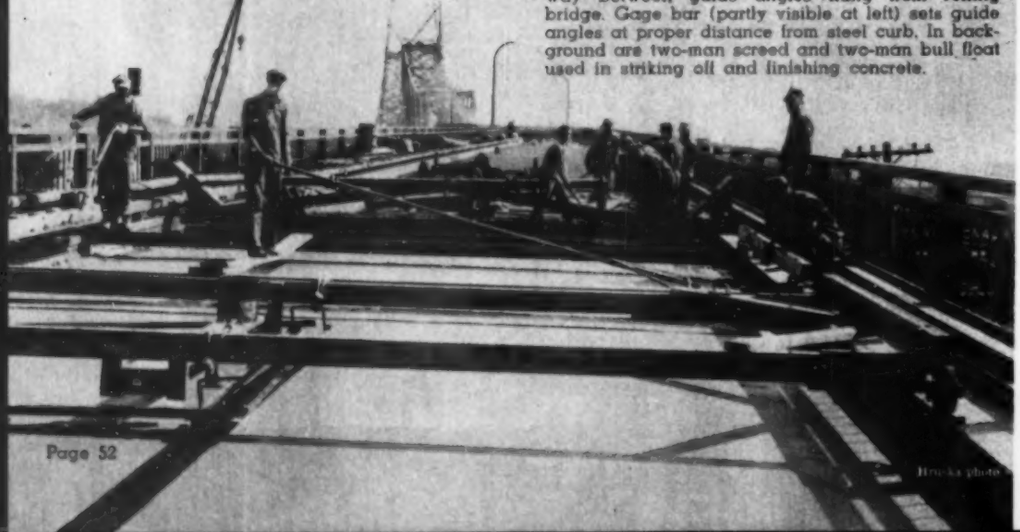


**PUMPED CONCRETE** drops from end of pipe line into mass of reinforcing steel where it is vibrated by gasoline-powered flexible-shaft vibrator resting on plywood working platform in foreground. Hruska Photo

# Bridge Deck Paved With *Pumped Concrete* On Plywood Forms

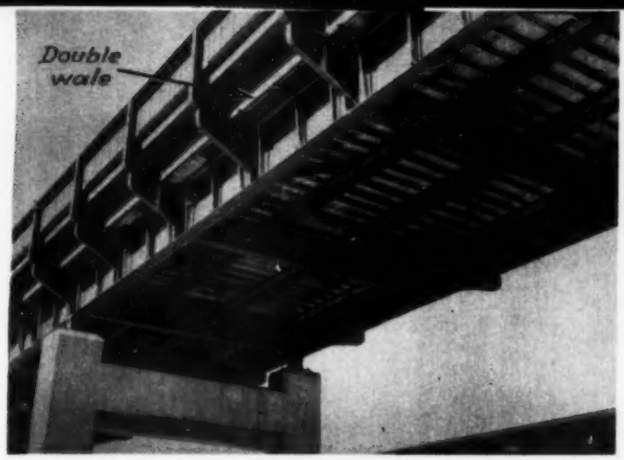
**DELIVERY OF CONCRETE** to deck forms from a pump on the ground facilitated roadway paving by Melberg & Taylor, of Cedar Rapids and Decorah, Iowa, on the girder spans of the 1;450-ft. west approach for a new highway bridge across the Mississippi River at Dubuque, Iowa. Set up at three separate locations, the pump delivered concrete through 6-in. pipe line up to 300 ft. long, with as much as 50 ft. of vertical rise, at rates of 18 to 20 cu.yd. an hour. Using hand finishing methods on the roadway slab, 24 ft. wide by 7¾ in. thick, a deck crew totaling 20 men was able to complete 150 to 175 lin.ft. per 10-hr. day, including installation of an integral center-line traffic stripe of black magnetic iron oxide, floated into the wet concrete.

Deck concreting was aided by a simplified form system developed to meet conditions on the job; the system utilized plywood sheets supported on wood joists blocked up by shores or wedges from the lower flanges of the plate girders or I-beam stringers. Melberg & Taylor, who are putting in the deck pavement for the Bethlehem Steel

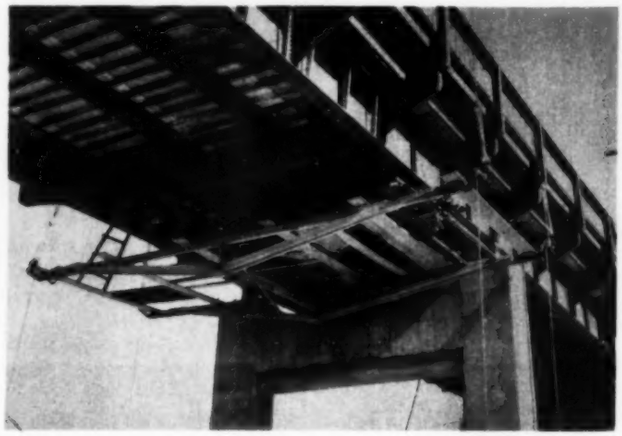


**INTEGRAL TRAFFIC STRIPE** 8 in. wide of black iron oxide is floated into surface on center line of roadway between guide angles hung from rolling bridge. Gage bar (partly visible at left) sets guide angles at proper distance from steel curb. In background are two-man screed and two-man bull float used in striking off and finishing concrete.

**DECK PAVING** is directed by CLYDE B TAYLOR **(below)**, of Melberg & Taylor, here resting an arm on one of his plywood panels.




**DOUBLE WALE** suspended by bolts from steel channel carries outer edge of plywood form for portion of slab extending beyond girder. Interior form system rests on runners supported by wedges from lower flanges of I-beam stringers and by vertical shores from lower flanges of plate girders.



**TO STRIP FORMS** from underside of bridge deck, workmen use hanging scaffold suspended from handrailing. Forms are released by knocking out wedges and shores.

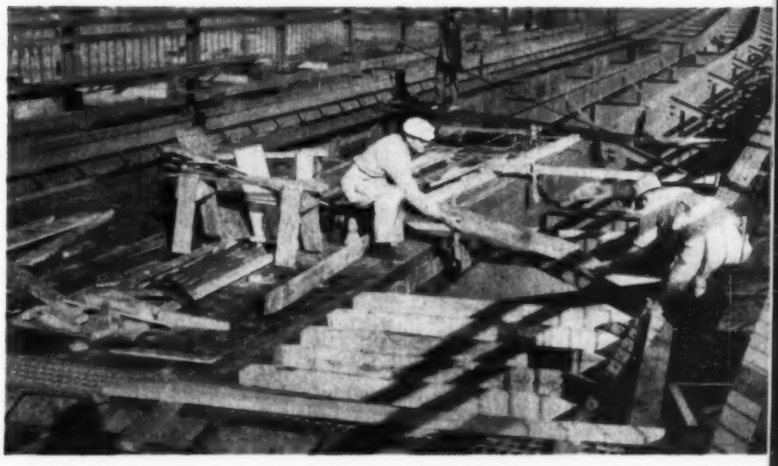
Hruska photo

**SET UP ON GROUND** beside bridge, concrete pump delivers 18 to 20 cu.yd. an hour through 6-in. pipe line to deck. Aggregate batcher equipped with trolley weigh hopper furnishes measured quantities of sand and gravel to 14S mixer which charges concrete pump.

Co., holder of a superstructure contract for the entire bridge from the City of Dubuque Bridge Commission, will resume operations in the spring on the east approach girder spans and on the truss spans over the channel to complete the pavement for opening of the highway crossing early in 1943. The bridge has a total length of 5,760 ft. Steel erection was described in *Construction Methods*, March, 1943, p. 48.

*Deck Forms* — Accompanying photographs show the construction of the form system, which makes use of panels of ¾-in. plyform-grade plywood laid on 2x6-in. wood joists, cut to shape and installed on 16-in. centers. The joists in turn rest on 2x6-in. or 4x6-in. runners supported by wooden wedges from the lower flanges of the I-beam stringers and by vertical shores from the lower flanges of the deeper plate girders.

*(Continued on page 133)*

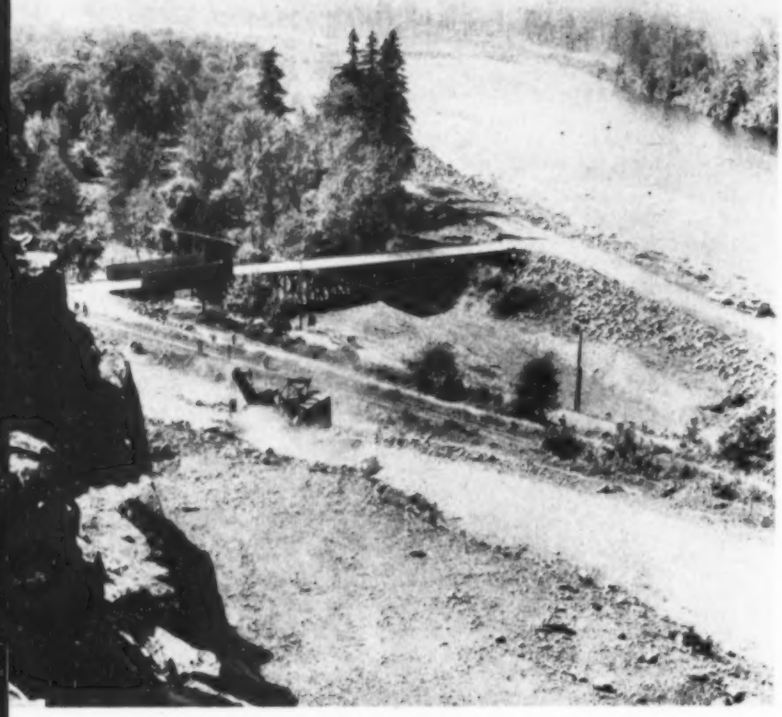


**WOOD JOISTS** mitered at two ends to accommodate thickened slab over steel girder and stringer are placed by carpenters on wood runners blocked up from lower flanges of steel members. Joists carry ¾-in. plyform deck for concrete slab.

**FORM BOLT (below)** carrying double wale under steel channel is drawn up with Tiger ratchet wrench.

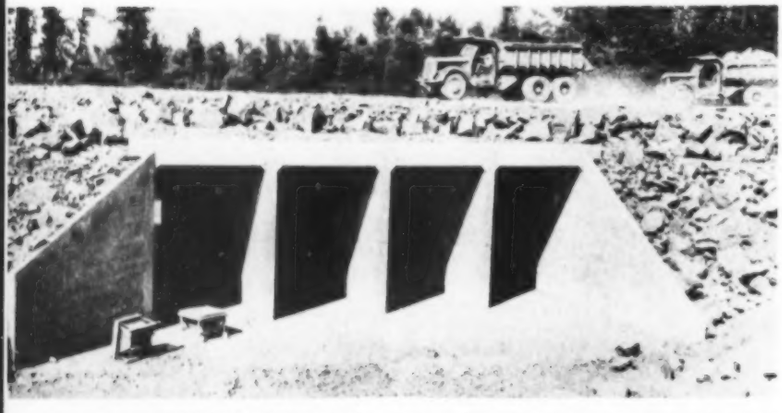
**PIPE LINE (below)** on bridge sidewalk permits concrete delivery to any desired point for roadway construction. In deck reinforcement, bars of rerolled rail steel are substituted for welded bar trusses to meet war restrictions.

Hruska photo



**NEW RAILROAD EMBANKMENT** close to river's edge shifts main-line track away from highway, eliminating large number of grade crossings and providing space for extensive future improvements. Temporary construction bridge furnishes truck roadway between rock excavation site in foreground and railroad grade stretching into distance along river bank.

**BLASTED ROCK** shaken down from sharp promontory is loaded into trucks for delivery to railroad grade, which crosses multiple-box culvert in background.



**FOUR-BOX CULVERT** carries mill race under new railroad grade built up of dumped rock fill on river bank.

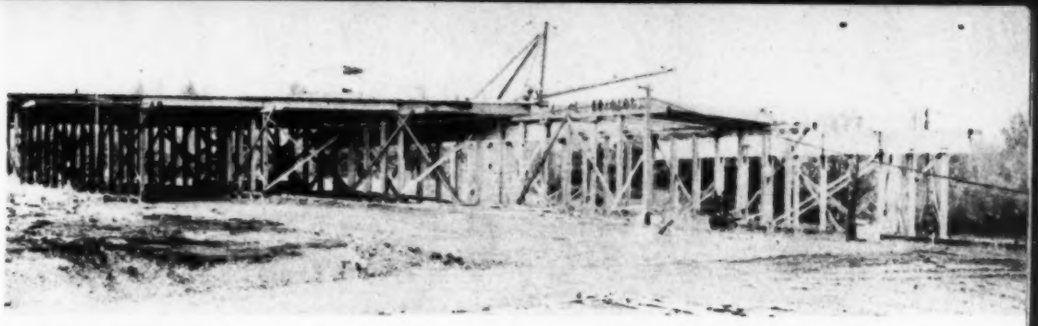
# *Railroad Relocation*

## Clears Way for Oregon Highway Improvement

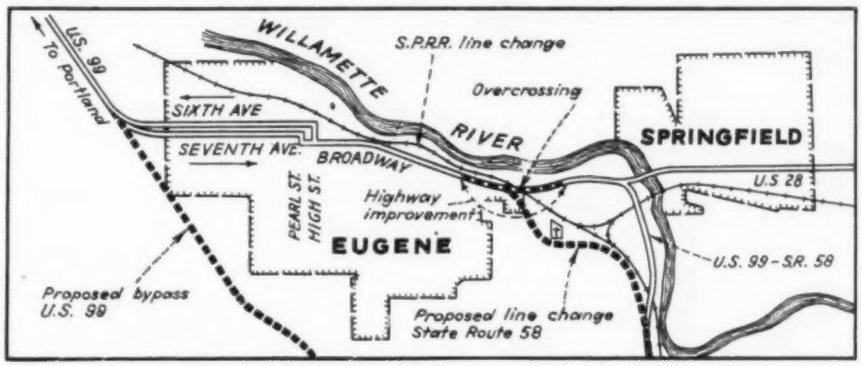
**TEMPORARY OVERHEAD BRIDGE (below)** of treated timber is built to carry highway over only crossing that remains after railroad has been relocated. War restrictions rule out previous designs of structural steel and reinforced concrete.

**CONNECTING ROAD,** with subgrade partially finished, passes under two spans near one end of temporary railroad overhead to permit interchange of traffic without crossover on main highway.

By R. H. BALDOCK
Chief Engineer
Oregon State Highway Commission, Salem, Ore.



**WOODEN FIREWALLS** are installed at intervals of about 100 ft. under deck of treated timber bridge to prevent spread of flames in event of fire.




**RAILROAD LINE CHANGE** eliminates ten of eleven grade crossings on heavily traveled road between Eugene and Springfield, Ore. Remaining crossing is bridged by temporary timber structure, and highway approaches on both sides of bridge are graded and paved. Additional extensive improvements have been postponed until after the war.

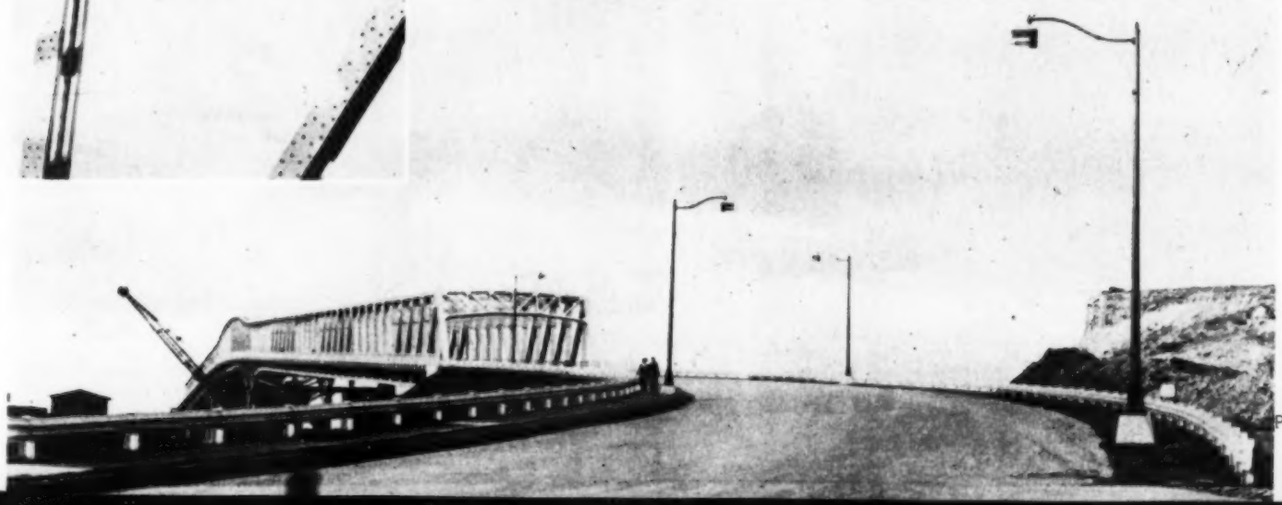
**TO MAKE WAY FOR** sorely needed improvements on a relatively narrow and heavily traveled connecting road which carries the concentrated traffic of three converging routes between Eugene and Springfield, the Oregon State Highway Commission shifted the main-line track of the Southern Pacific R. R. away from the existing highway to a new location on the bank of the Willamette River, thereby eliminating ten of eleven grade crossings and obtaining right-of-way for future construction of a four-lane divided parkway. With the railroad shifted to a safe distance, the highway department limited its objectives in accordance with war requirements to removal of the last major hazard on the route by bridging the eleventh crossing with a temporary structure of treated timber and grading and paving the new approaches to the bridge for a total distance of 1.08 mi., indicated on the accompanying map. Additional construction to convert the road into a divided highway will be put under contract only after war restrictions are lifted.

Work on the present improvement started with the letting of a contract for 1.87 mi. of new railroad grade to Strong & MacDonald, Inc., Tacoma, Wash., on a bid of slightly more than $205,000. The contract, completed last August, involved 193,000 yd. of earth and rock excavation — 99,000 of solid rock, 61,000 of common and 33,000 of borrow. Building an embankment for the railroad close to the river's edge necessitated some changes in an existing mill race, with construction of relief openings, gates and lift-

*(Continued on page 137)*

## *Open-Type Sodium Luminaires*

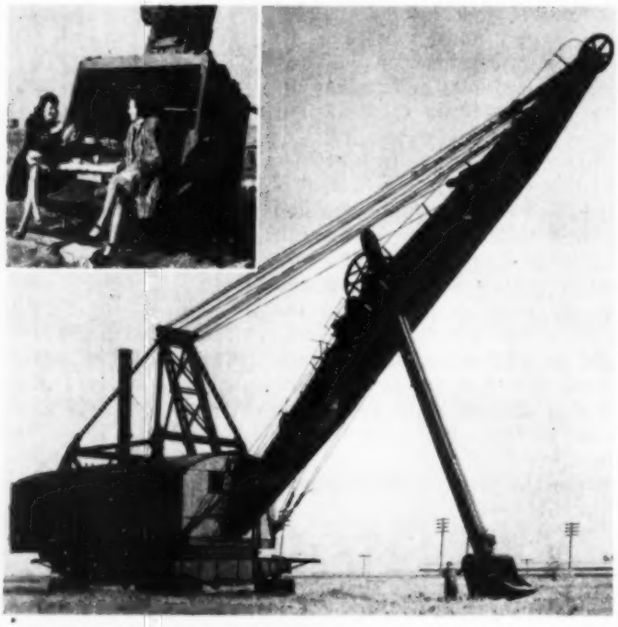
**equipped with airplane reflectors and operating 10,000-lumen sodium lamps in horizontal position, provide after-dark illumination for span proper and approaches of new Central High Level bridge at Lorain, Ohio. Bridge girders carry 17 lights *(left)*, and 26 others are installed on ornamental poles along highway *(below)*. General-Electric Co. engineers developed system.**



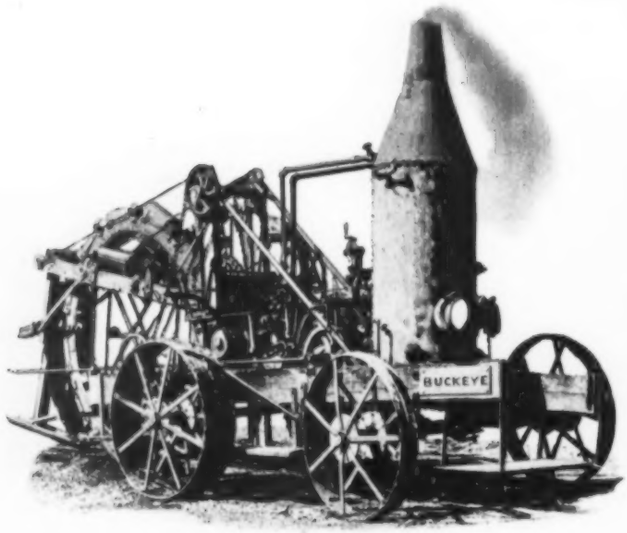
# JOB oddities

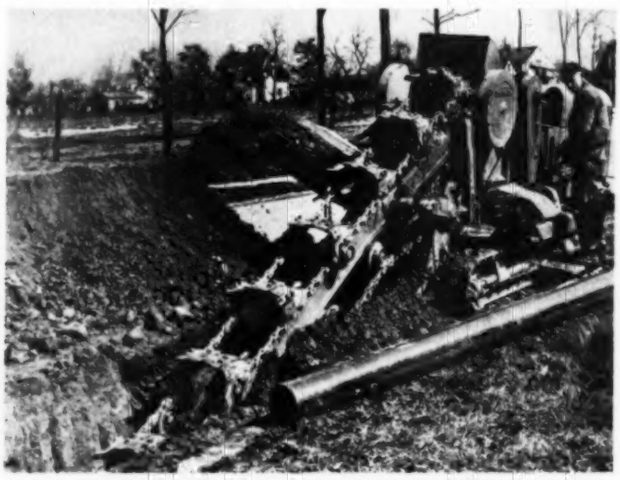
**HORSE-DRAWN ROLLERS** are still being used to compact snow on Vermont's back roads, according to 1942 annual report of Commissioner Hubert E. Sargent of state highway department.

**STYLISH FLAMEPROOF HEADGEAR** is created for General Electric's women welders by Sally Victor of New York, well-known designer of women's hats. These turbans combine fashion with utility and fit comfortably under welding helmets.



**RECRUITED FOR STEEL SCRAP DRIVE** is this ancient and outmoded steam shovel, equipped with 6-cu.yd. dipper and weighing 300 tons. Designed in 1911 for coal mine stripping, this model cost, when new, more than $100,000, according to the Equipment Corp. of America, Chicago, dealer in rebuilt construction equipment, which claims that shovel is one of largest units contributed to scrap drive. Machine has boom 90 ft. long and dipper handle 54 ft. long. Shovel's 150-hp. boiler is being salvaged for use on defense project.

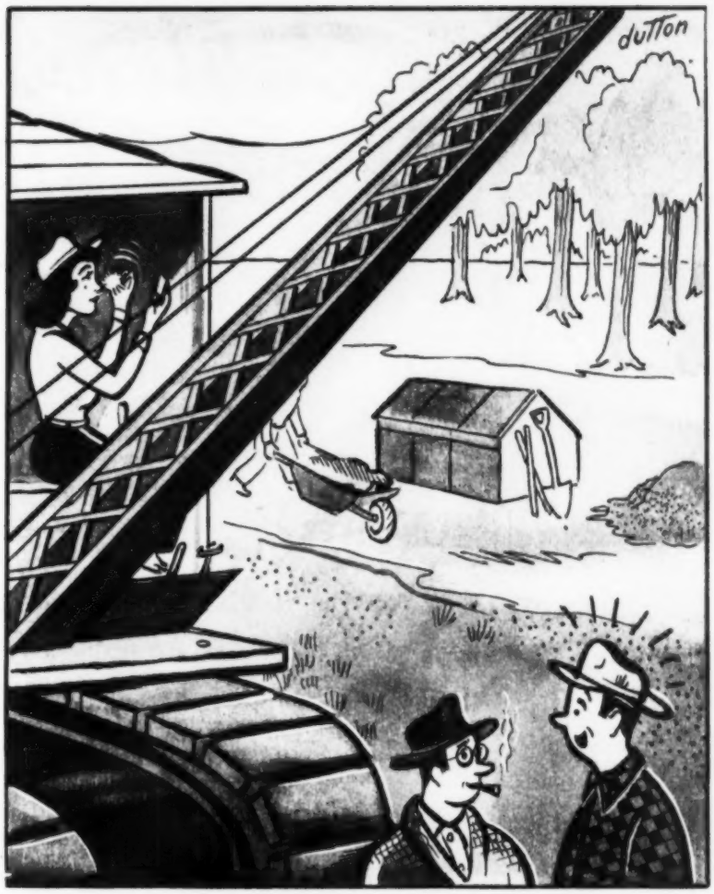


**FIFTY YEARS OF PROGRESS** in design of wheel-type ditching machines by Buckeye Traction Ditcher Co., of Findlay, Ohio, is indicated in these two photographs. Model at left, built by James B. Hill at time of Columbian Exposition in Chicago, sold for $700 and was powered by steam. Modern unit, at right, powered by diesel or gasoline engine and mounted on crawlers, is being widely used on war construction projects at army camps, ordnance plants and naval bases, and in building urgently needed oil pipe lines.

# THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

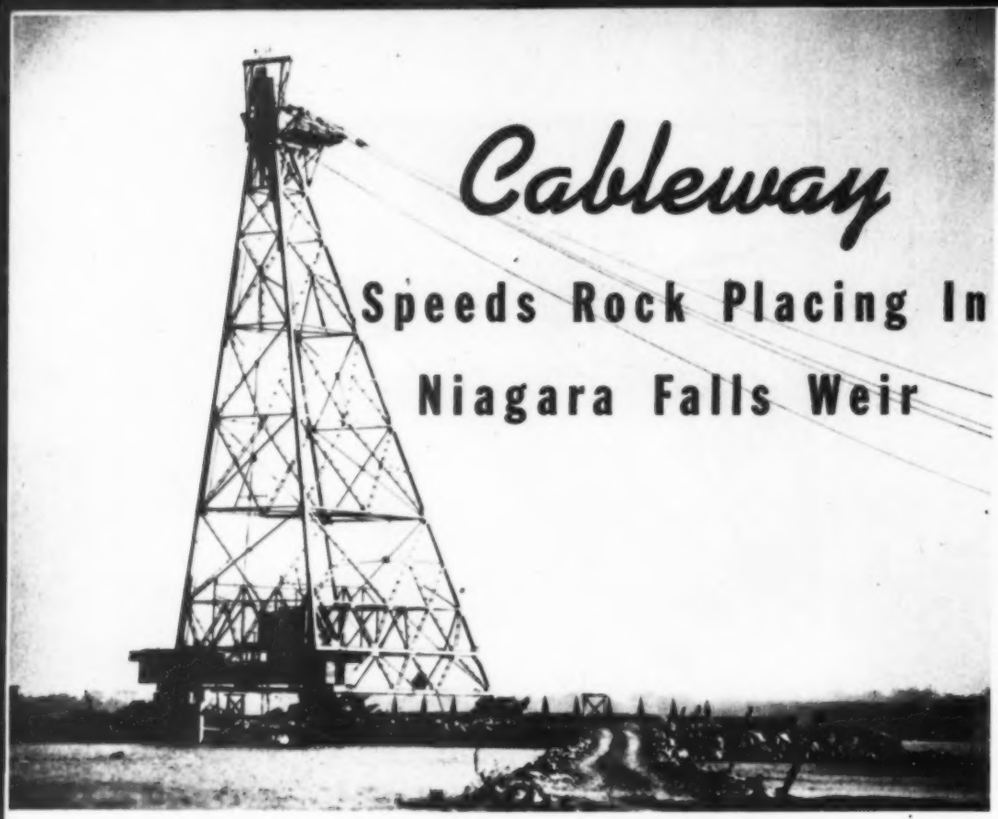



*"It must be 12 o'clock—Miss Bartlett is starting to powder her nose!"*

*"Do you expect me to hold this until Donald Nelson answers your wire for release of additional material?"*

*"I don't care how you did it in that delicatessen shop—this is lumber, not baloney!"*

# Cableway Speeds Rock Placing In Niagara Falls Weir



**ARTIFICIAL ISLAND (left)** at upstream end of causeway surrounds two stone-filled cribs supporting railway tracks under mobile tail tower. Connections for tramway cables are 155 ft. above tracks under tower.

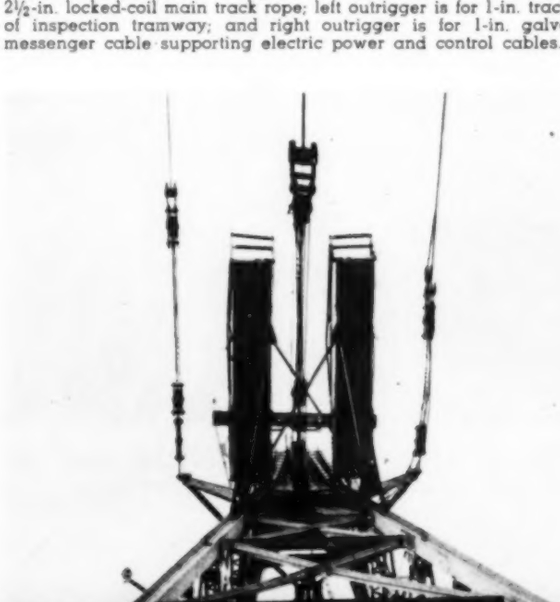
**CORE STONE,** to be placed in weir on upstream side of row of large toe stone, is transported in skip by cableway to dumping point.

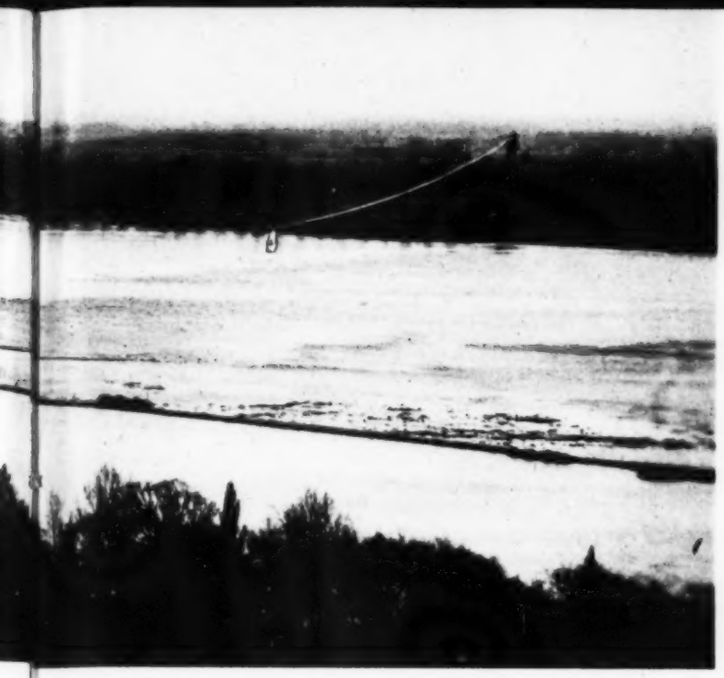
**AS A MEANS OF ACCOMPLISHING** in one season what otherwise would have taken two, the U. S. Engineers and the Federal Power Commission in cooperation with the Dominion Water and Power Bureau of Canada and the Hydro Electric Power Commission of Ontario spanned the main channel of the Niagara River above Niagara Falls, between the Canadian shore and a specially created artificial island, with a ½-mi. cableway which placed about 27,000 tons of rock in a submerged weir 1,500 ft. long to divert more water to the American side and improve flow conditions in the intakes of power plants before ice started to run in the river. As a collateral benefit of lasting importance, the diversion has improved scenic effects by putting more water over the American Falls, which formerly carried only a meager fraction of the flow. This latter benefit actually was the primary purpose envisioned in the peacetime report upon which authorization for the current work was based.

By handling up to 500 tons of rock per 10-hr. day on the 2,600-ft. cableway, supported between traveling steel towers which previously had served on the construction of Conchas Dam in New Mexico and Denison Dam in Texas, the desired diversion was largely achieved within three months after the placing of the first stone. With the main body of the weir effectually completed, the cableway continued in operation through

**LOOKING UP (below)** at top of tail tower, center assembly is for 2½-in. locked-coil main track rope; left outrigger is for 1-in. track rope of inspection tramway; and right outrigger is for 1-in. galvanized messenger cable supporting electric power and control cables.

**TOWER TRAVEL (below)** of 100 ft. is marked off by eleven targets at 10-ft. intervals. On clear day, these targets are visible from head tower.





**LARGE CABLEWAY INSTALLATION** of 2,600-ft. span hastens rock placing in submerged weir 1,500 ft. long to gain desired increase in water depth within three months after first stone is deposited. Riffle in river surface indicates effect of partially completed weir.

**TO BUILD SUBMERGED WEIR** in Niagara River above rapids on Canadian side at Niagara Falls, cableway ½ mi. long is erected between tail tower on artificial island and head tower on Ontario shore. Temporary construction causeway extends upstream on rock shoal from Goat Island to tail tower.

the winter on the slower work of facing the upstream slope of the weir with large rectangular blocks. The cableway will remain in place for several years to take care of any additions that may be deemed advisable.

*Cableway Layout*—Each cableway tower is mounted on four flanged-wheel railway trucks which roll on two parallel tracks 160 ft. long, providing about 105 ft. of travel for the cableway at right angles to the axis of the weir. Propulsion equipment, consisting of two electric-motor-driven trucks under each tower, is centrally controlled from the head tower. Under the head tower, on the Canadian side, crossties of the tracks are bedded in ballast stone placed on top of stone-filled trenches which were excavated 4 or 5 ft. deep in earth and paved on the bottom with large slab stone.

At the artificial island on the American side, tracks for the tail tower are supported by stone-filled timber cribs, 160 ft. long and 14 ft. wide, built of dapped and doweled 10x10-in. pieces laid up in solid walls and diaphragms from the rock bottom of the river, about 7 ft. below the water surface. Height of the crib under the rear track is about 15 ft., and that under the front track, tilted to take the horizontal thrust of the tower legs, is about 16 ft. for the forward wall and about 12 ft. for the rear wall. A permeable, self-relieving rockfill causeway, incorporating a large percentage of heavy stone, connects the artificial island with the upper end of Goat Island, 2,200 ft. downstream. Similar rock fill was placed between and around the cribs to complete the artificial island, which is about 1 acre in extent.

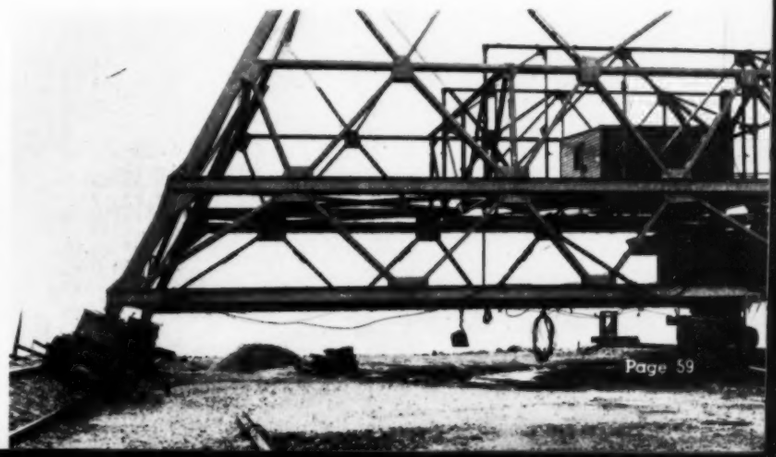
Steel-rail tracks under each tower are spaced 76 ft. 10 in., c. to c., and the spread of the tower legs in the other direction is 46 ft. 11 in. At the towers, the height of the track cable above the steel rails is 155 ft. Each tower contains 165 tons of structural steel. Including trucks, equalizers, hoisting machinery, crown block and outriggers, the head tower on the Canadian side weighs 215 tons. This tower was counterweighted with an additional load of 257 tons over the rear track to resist uplift; a counterweight of 260 tons was placed on the tail tower.

## Cableway Operation

Single stones weighing 3 to 10 tons and skiploads totaling 15½ tons, of which 7 tons was rock in smaller sizes, were handled by the cableway on a 2½-in. locked-coil track rope. Loads were conveyed at 1,250 fpm.

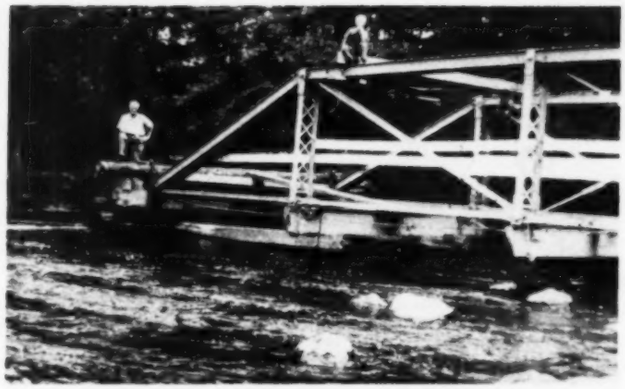
*(Continued on page 138)*

**STONE BLOCK** weighing 9 tons for downstream toe of weir is picked up by cableway from flat-bed truck at head tower. Note dump line fall block, at right, used to release hooks. Spotting of stone in weir is directed from transit station, about 1,000 ft. downstream, from which instructions are telephoned to cableway operator.



**RAILWAY TRACKS (right)** on artificial island are supported above rock-filled timber cribs. Front track is inclined to take horizontal thrust. Two of four flanged-wheel trucks under legs are powered with electric motors to move tower.

**WASHED FROM ITS PIERS** by flood, bridge is carried downstream 1,000 ft. and lands in shallow water.



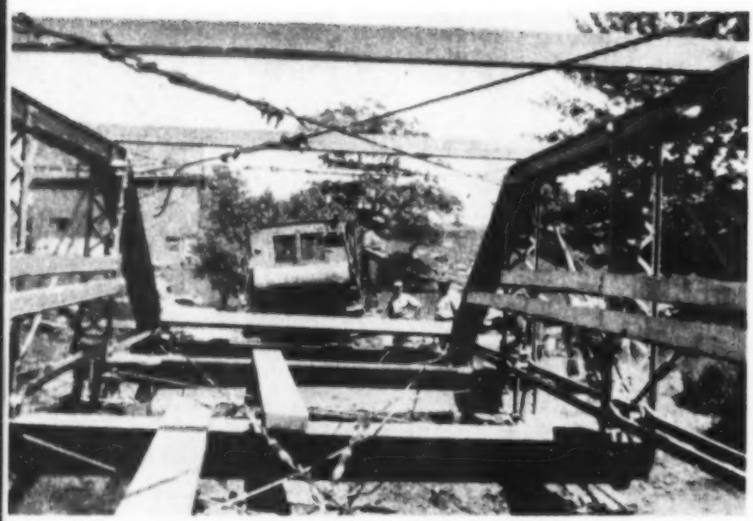
**WITH AID OF TIMBER CRIBS** at ends of truss, bridge is jacked up to allow skids to be attached to bottom members preliminary to hauling structure back along streambed to original site.

# *Washed-Out Bridge*

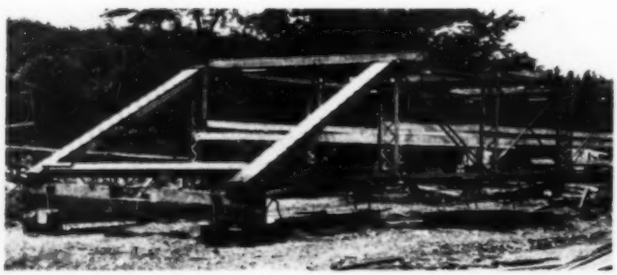
## Is Hauled Back Upstream, Repaired and Replaced on Piers

By H. W. EVANS

Superintendent, Lackawanna County,
Pennsylvania Department of Highways



**HAULED UP RAMP** on stream bank by tractor bridge is protected against deformation by diagonal wire cables and cross-bracing across top of truss.



**LANDED ON RIVER BANK** after journey upstream bridge is repaired by removing and replacing old I-beams.

**SUPPORTED BY FALSEWORK (below)** recaptured bridge is shoved across stream to rest on original piers.

**DURING THE FLASH FLOOD** of May 22 and 23, 1942, the steel truss bridge on Route 63007 in Salem Township, Wayne County, Pa., crossing the west branch of the Wallenpaupack Creek, about 2½ mi. southeast of Hollisterville, was washed away and floated downstream approximately 1,000 ft., landed on its side, and then came to rest in an upright position on the streambed. This bridge was erected in 1888, and had never been damaged by any previous high waters. It was constructed on loose stone masonry abutments with a span of 68.5 ft., an overall length of 73 ft., had a 7-ft. clearance, a wood plank floor with a roadway width of 13 ft., and weighed approximately 26 tons.

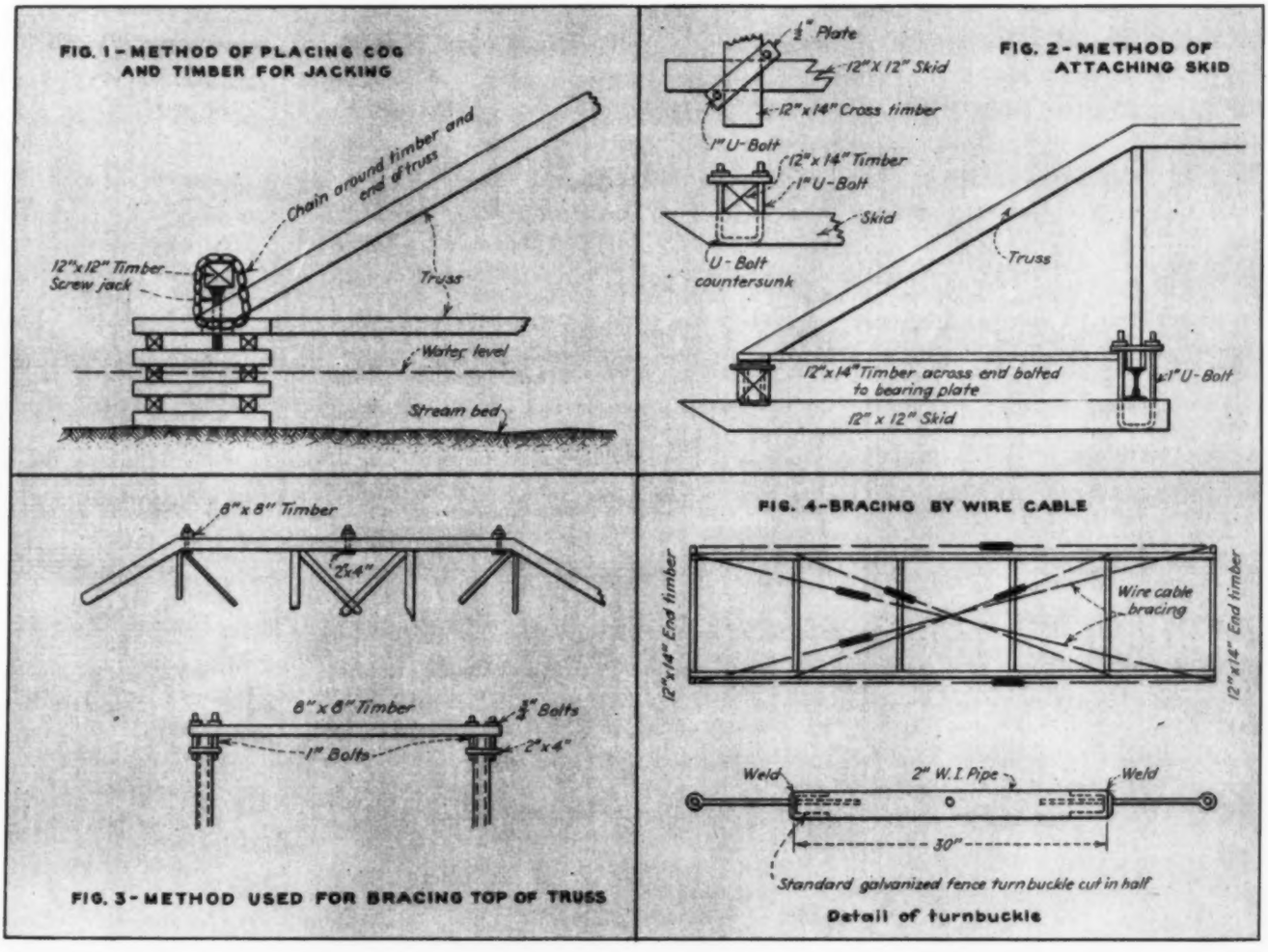
Repair work on this bridge, because of the enormous amount of damage which was caused by the flood in Wayne County, was assigned to the Lackawanna County maintenance organization and $3,000 was authorized for the work. An inspection was made of the structure, and it was decided to skid the bridge back into place without dismantling the steel framework. The sequence of operations in replacing the bridge is described in the following notes.

### Jacking Operations

The bridge was first jacked up where it stood in the water, which ranged from 12 to 24 in. in depth. To do this, two cribs of salvaged railroad ties were built at each end of the trusses and to serve as a base for lifting jacks (Fig. 1). The near side of the cribs was placed 18 in. outside the line of the truss to furnish the necessary clearance for placing timbers, which were later fastened to bearing plates. A 12x12-in. timber was then placed crosswise at the end of the trusses, projecting about 30 in. on both sides and about 2 ft. above the elevation of the bearing plates. This timber projected far enough out over the cribs to provide space required for placing jacks, and was fastened to the lower part of the truss near the bearing plate with a heavy chain. Using the cribs as a base, this timber was used for jacking purposes until sufficient clearance was had for placing the other timbers necessary. A screw-type jack was used, capable of lifting 25 tons, and when the jacks were fully extended, blocking was placed under each bearing plate, the jacks were released and the cribs built up ready to make the next lift. This procedure continued until the required clearance was obtained under the bearing plates.

Two 12x14-in. timbers were used to tie in the ends of the trusses, and were bolted to the bearing plates, using the holes formerly occupied by the anchor bolts. Above this, and as close to the bottom of the truss as possible, an 8x8-in. timber was placed to act as a spreader to prevent the truss ends from pulling together when the movement was made. A 12x12-in. timber then was placed parallel to the line of the truss, extending from the timber which was placed across the end, back to the first steel cross member under the floor; this was to act as a skid. (Fig. 2) The front end of the skids was fastened to this cross timber by a large U-bolt which extended around both of the timbers and bolted on top by the use of a ½-in. steel plate; the rear end was fastened to the

*(Continued on page 128)*

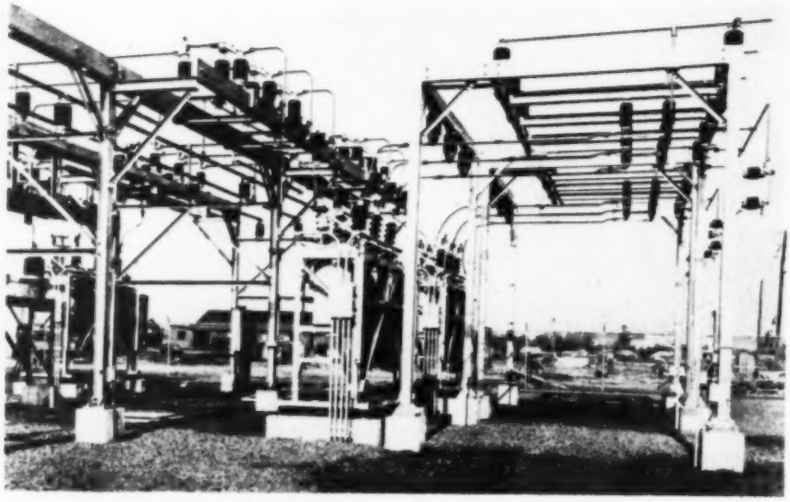



**SEQUENCE OF OPERATIONS** in preparing washed-out bridge for haulage along streambed back to original site is illustrated by rough sketches, not to scale, supplied by author.

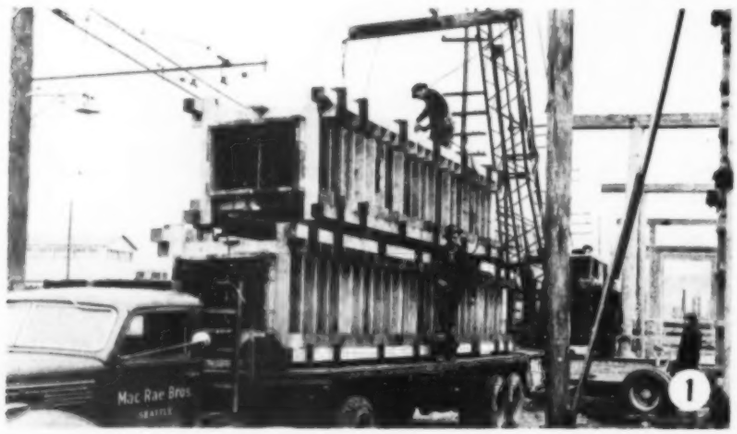
# HOW *They Did It*

**CONSTRUCTION DETAILS**

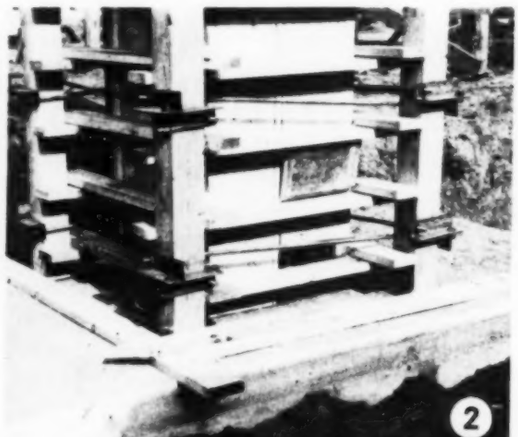
*For Superintendents and Foremen*



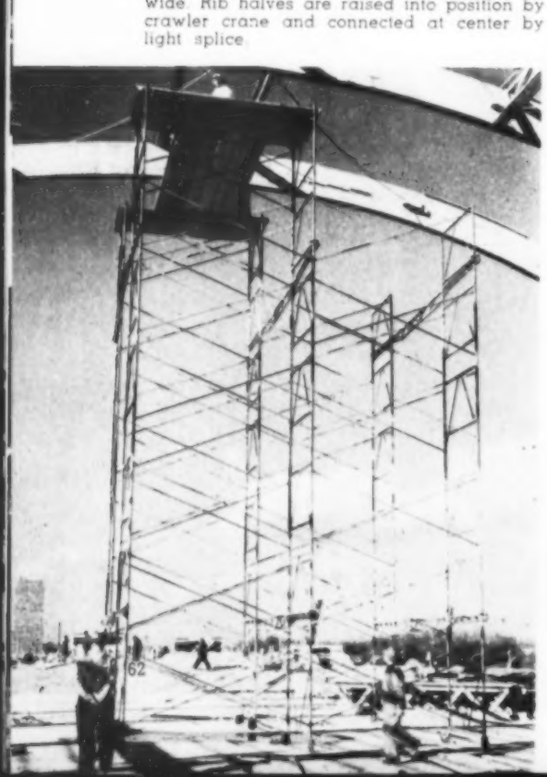
**LUMBER REPLACES STEEL** to save 40 tons of critical material in constructing switching station for Public Service Electric & Gas Co. of New Jersey. Thirty thousand board feet of longleaf yellow pine, pressure-treated with Wolman salts preservative, are substituted for galvanized steel framing ordinarily used. Steel supports for switches are entirely replaced by wood, and wood beams are used in connection with steel columns.

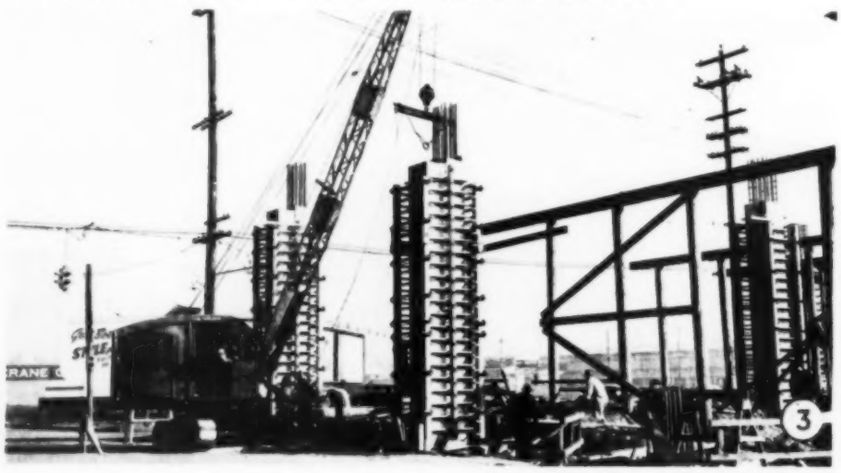


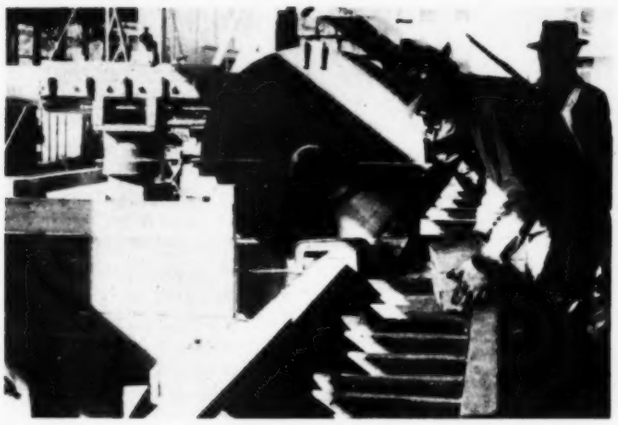

**TALL TUBULAR STEEL SCAFFOLDS (below),** mounted on wheels and carrying platforms at top, enable workers of Charles H. Tompkins Co., contractor, of Washington, D. C., to splice two halves of 120-ft. laminated timber arch rib spans of 625-ft. long drill halls at Navy's Camp Bainbridge, Md. Arch ribs, with crowns 39 ft. above floor, consist of 37 pieces of ⅛-in. lumber glued together under pressure to produce net cross-section 30 in. deep and 7½ in. wide. Rib halves are raised into position by crawler crane and connected at center by light splice.



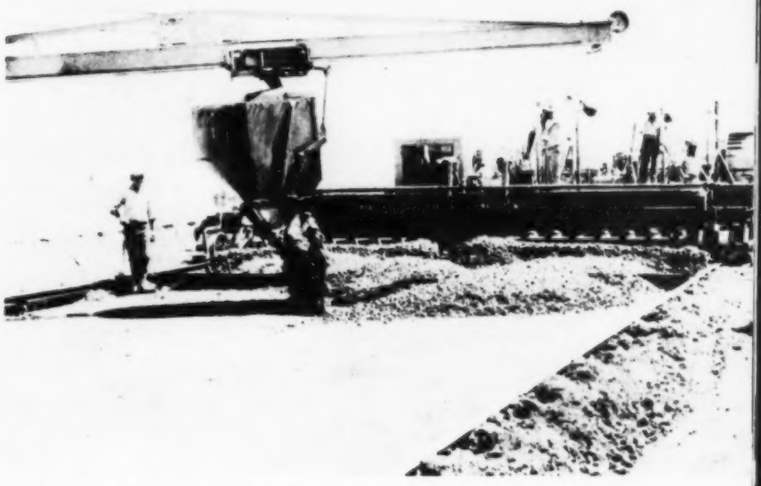

**PRE-ASSEMBLED COLUMN FORMS,** with reinforcing steel inserted and secured in place, are built at contractor's yard and hauled to site of new viaduct in Seattle to expedite construction in midst of heavy traffic. Small precast concrete block spacers, with embedded fastening wires, hold reinforcing bars at proper distance from inside surfaces of form. In photo **(1)** above, column assemblies are placed on special truck for delivery. Photo **(3)** below shows crawler crane setting form and reinforcing steel in place. During handling, reinforcing steel at top of column is temporarily held in place by steel angles bolted to reinforcing and bearing on top of form. Photo **(2)** above shows form in place on footing with clean-out door open. Boring of holes in timber is avoided by use of angle clips and outside rods. Forms are of five-ply plywood backed by 2-in. plank, and can be quickly removed and reassembled for further use.



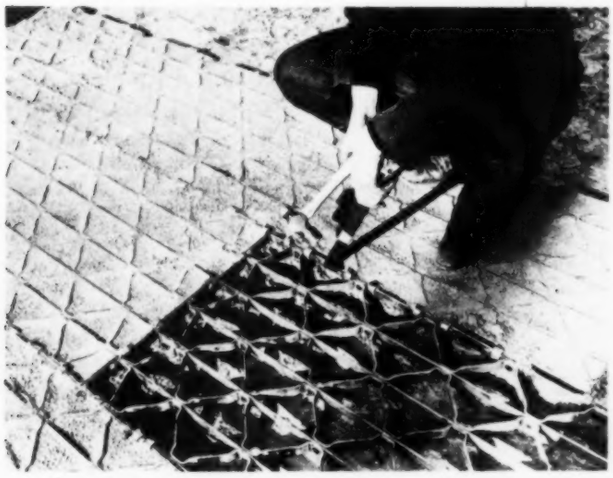




**CUTTING OF LARGE TIMBERS** for pier construction at West Coast shipyard is done with 30-in.-diameter Irvington circular saw powered by General Electric motor and mounted on T-head. Spring in cantilevered mounting draws saw back away from cutting bench when operator's hand is released.



**V-TRENCHED SUBGRADE** is prepared for paving of 25-ft. wide lanes of California airport runways to supply extra depth of concrete slab at longitudinal dummy joint. Slab of 9-6-9-in. section is without steel reinforcement, except for corner dowels at expansion joints.



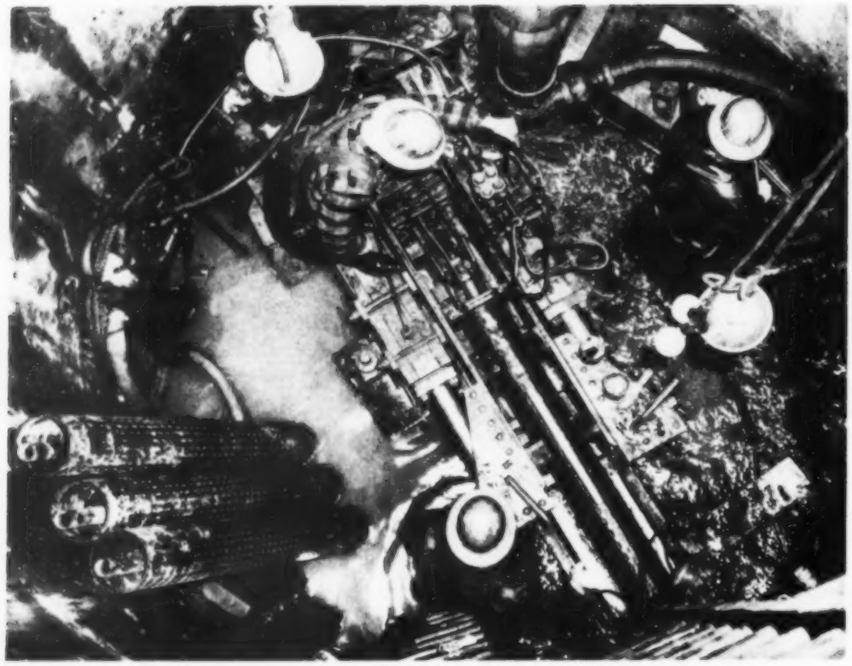
**PORTABLE RUNWAY MATS** of type used by Army Air Forces for emergency landing fields in many parts of world are laid in test roadway on grounds of Irving Subway Grating Co., Long Island City, N. Y. Workman with hammer and pronged tool joins grating mats, each 2x12½ ft. in size, by driving steel slip-collars on one unit over spearhead splice bars of adjacent mat. Grating is filled with sand, later sprinkled with oil.

**EMPTY MOTOR OIL DRUMS** are used to float into position for sinking a 175-ft. underwater pipeline across shallow harbor of Michigan City, Ind. Drums are wired to sections of 12-in. mechanical joint cast-iron pipe, alternating three to first section, two to next, and so on. Line is jointed and floated into position section by section, over trench previously excavated by clamshell operating from nearby bridge. After pipe has been anchored in place and tested for leaks, it is lowered into position by cutting wires to release drums successively. Center drums of three-drum sections are removed first, then every alternate one of those remaining. Pipe finally settles on bottom with seven of original 35 drums used still attached. These are removed by diver. After 12-in. risers have been added, pipe is sterilized, and filled with water to give it additional weight for settling. Tests of line disclosed no leaks, according to H. J. Draves, superintendent, Department of Waterworks, so trench was backfilled and line placed in service.

Photos, C. I. Pipe Research Ass'n.

**GRAVITY LOADING (below)** of gravel into trucks for surfacing Alcan Highway is done by Caterpillar D4 tractor equipped with LeTourneau bulldozer blade. Logs cut from nearby timberland are used to build up underpass for trucks. Bulldozer pushes gravel on to grizzly through which material passes into truck body.

**VERTICAL SPRINKLING PIPE (below),** rigged on tank-truck, applies water to cotton mats for curing 11-ft. wide lanes of concrete pavement placed by Texas State Highway Department near Dallas. Vertical pipe, according to Edward F. Maddox, senior resident engineer, has advantage over horizontal pipe commonly used because it clears all obstructions along line of travel.



**HORIZONTAL SCREEN PIPE** to which additional 8-ft. pipe section has just been welded is projected further through port in wall of caisson well by jacking apparatus incorporating two hydraulic jacks. Against wall at left rest three more sections of perforated screen pipe containing inner 2-in.-diameter sand line which conveys fine material from boring head through screen pipe as head is pushed farther into sandy soil.

# Horizontal Radial Well Dewaters Ground for Driving of Shield Tunnels

**BY APPLYING A RANNEY RADIAL COLLECTOR WELL** for the first time to dewater ground, the George H. Flinn Corp., contractor for the New York City Tunnel Authority, lowered the groundwater level sufficiently in the sandy soil just ahead of the construction shafts at the Brooklyn end of the Brooklyn-Battery vehicular tunnel to permit advancing the twin shield-driven cast-iron-lined tubes of this project for a considerable distance without recourse to compressed air. So effective were the radiating horizontal screen pipes of the collector system in drawing down the groundwater to a maximum depth of nearly 50 ft. below its original level that the contractor was able to drive the two tunnels an average distance of 425 ft. from the shafts before the downgrade of the tubes met the inclined gradient of the lowered water table, necessitating the use of compressed air ahead of bulkheads and air locks in the tunnels.

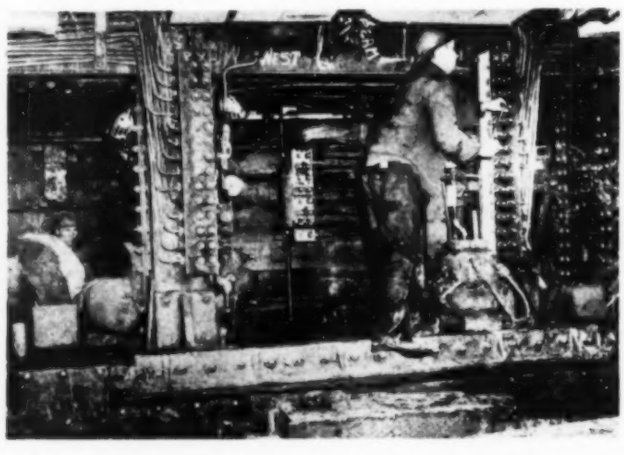
## Driving in Free Air

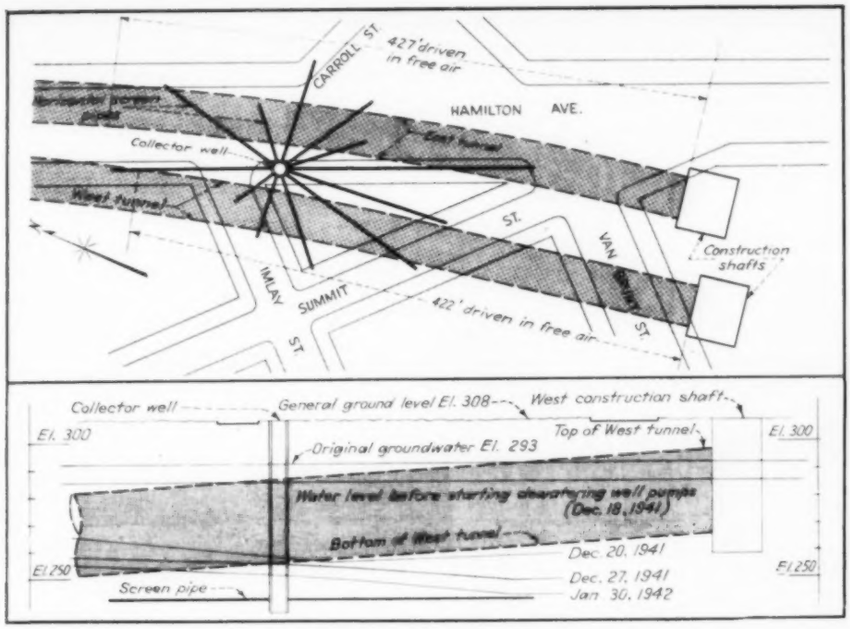
Dewatering the ground in this manner to a depth below the bottom of the 31-ft.-diameter tunnels eliminated completely the hazards of using compressed air to build the initial portions of the tubes, protected by insufficient cover. Depth of cover, which was only 10 to 12 ft. at the construction shafts, increased to slightly more than 20 ft. in a distance of 300 ft. The depth of cover and the original water level are indicated on an accompanying profile. Contract specifications called these conditions to the attention of the contractor and directed that some method be employed to lower the water level to a point where the balancing air pressure necessary for the construction of the tunnels could be safely sustained by the shallow

*(Continued on page 106)*

**TUNNELING IN FREE AIR (below)** is made possible by dewatering of ground, which leaves soil just moist enough for ready hand-shoveling or machine-mucking. Here sandhogs are loading moist material into muck skip during early stages of tunnel progress, mucking machine later is used to do this loading.

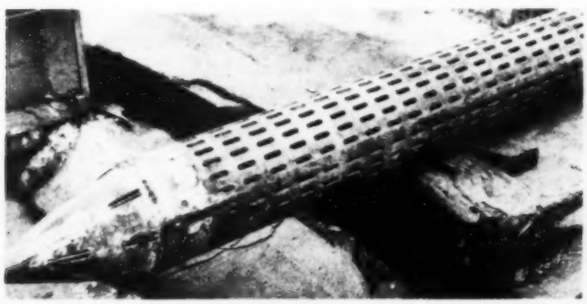
**INDIVIDUAL VALVES (below)** control hydraulic operation of 28 ring jacks mounted around circumference of shield and used to shove shield forward after each new ring, 32 in. wide, of cast-iron lining has been erected. Beyond jack spindle station are horizontal breasting boards (visible through side pockets) which hold face of tunnel, here being excavated in free air. Similar breasting in front of jacking pocket is concealed by steel channel bulkhead.





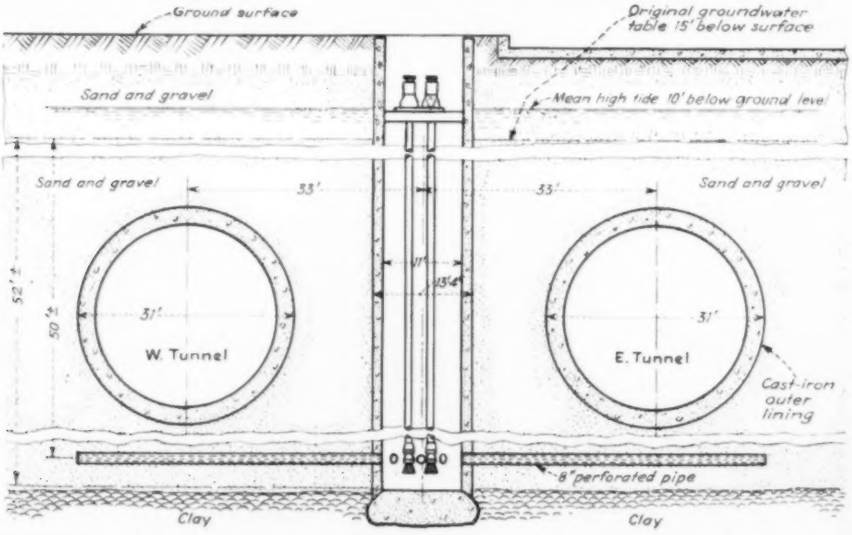

**Plan and Profile of Dewatering System**

**RADIATING HORIZONTAL SCREEN PIPES** projected into surrounding sandy soil through ports in wall of collector well on 12 lines totaling 1,100 ft. in length drain water from ground in advance of two shield tunnels and permit twin tubes to be driven considerable distance from construction shafts without use of compressed air. Rapid lowering of groundwater level is indicated on profile, dewatering starts Dec. 19, and water table actually is stabilized at lowest level about 27 days before final date shown. Groundwater gradients are drawn is accordance with readings made at observation wells. El. 300 is 2.653 ft. above mean sea level at Sandy Hook.



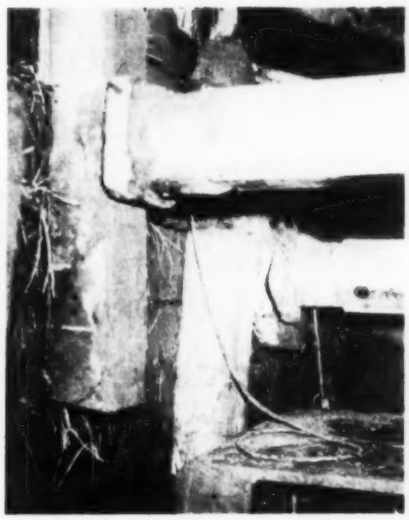
**FIRST SECTION OF SCREEN PIPE** with boring head attached and strainer pipe (containing smaller slots) placed inside is ready for lowering into caisson well, where it will be jacked through port in wall.

**CONSTRUCTION OPERATIONS** on contract with New York City Tunnel Authority for 4,000-ft. section of Brooklyn-Battery tunnel are directed for George H. Flinn Corp., contractor, by HARRY STRIPLING, superintendent.




**CAISSON WELL** sunk 70 ft. below ground surface and fitted with horizontal radial screen pipes at depth of 50 ft. below original groundwater level serves as collecting sump for drainage from perforated pipes, enabling drainage system to lower groundwater level 47 ft. for construction of two shield-driven vehicular tunnels of 31-ft. outside diameter in dewatered ground without use of compressed air. Vertical deep-well turbine pumps raise water from bottom of collector well to sewer connection 5 or 6 ft. below surface.

**MUCK SKIP** is handled out of construction shaft by stiff-leg derrick at great saving in time and labor over slower method of raising spoil through air lock. After bulkheads are installed in tunnels, this method is replaced by cage hoists and muck cars.



**TUNNEL JACKS** and hydraulic platforms hold timber soldiers supporting breasting boards at face of tunnel in front of shield. Face behind breasting boards is packed with hay.

**BEHIND TUNNEL SHIELD (below)** cast-iron segments set up in rings by hydraulic erector arm on shield are connected by 1¾-in. bolts on which nuts are first run up by pneumatic impact wrench, known as "mule". Bolts then are given first tightening, followed by two later tightenings, as additional rings are erected, by two men on 6-ft. ratchet wrench to develop bolt tension of 30,000 lb. per sq.in.

# *Soil-Cement Base*

## Built by Road-Mix Methods Using Improved Spreader for Bulk Cement

**BULK CEMENT TRUCK** with capacity of 600 sacks receives load from portable silo on railroad siding 3 mi. from job.

**FROM LARGE-CAPACITY TRUCK.** cement is delivered by screw conveyors to cement spreader on two-wheel trailer attached at rear.

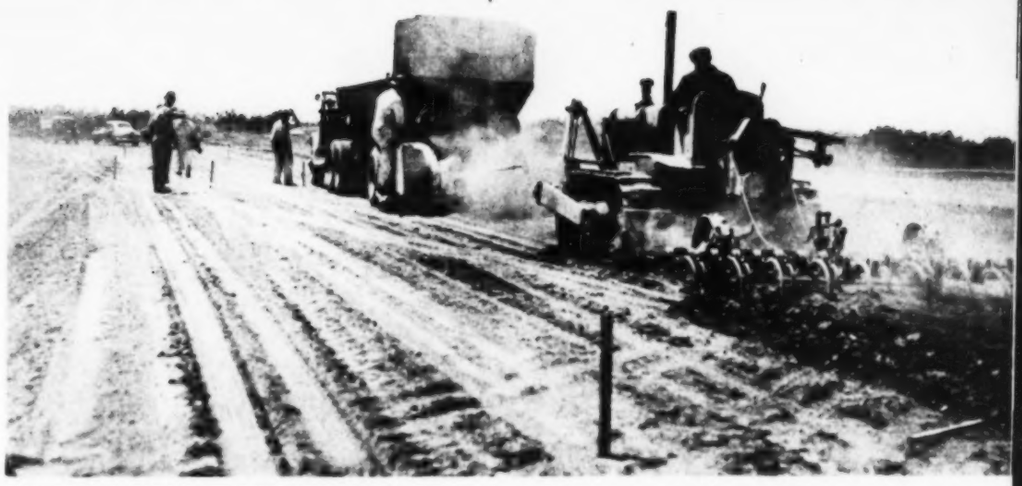
**CEMENT SPREADER (below),** shown in detached and attached positions, has drum beneath hopper from which accurately controlled quantity of cement is delivered in layer on ground beneath. Note housing over left wheel from which sprocket regulates cement delivery so that quantity discharged is constant at all speeds.

**SOIL-CEMENT STABILIZED BASE COURSES** for military airport runways, supply depots, storage areas and highways have been built on two California projects with the use of bulk cement delivered by a special large-capacity (600-sack) truck equipped with a pair of screw conveyors, and distributed uniformly and in accurately controlled quantities by a new type of spreader hauled behind the truck as a two-wheel trailer. Road-mix methods and machines were employed to incorporate the cement with the soil and final operations involved blading windrows of the soil-cement mix to layers of specified thickness and compaction first with a three-wheel 12-ton power roller and finally with a weighted, pneumatic-tired trailer.

Project A called for 168,000 sq.yd. of soil-cement roadway base 6 in. thick and 437,000 sq.yd., 4 in. thick, for open storage areas. The proportion of cement to soil used in both cases was 12 percent. By using bulk, instead of sacked, cement delays due to scarcity of cloth sacks were avoided and the usual wastage of ½ lb. of cement adhering to each sack was saved. Then, too, the hazard of rain damage to a couple of thousand sacks of cement distributed over the area to be treated was removed by using bulk cement distributed as needed from the big closed-body truck.

The contents of the big bulk-cement truck are fed by a pair of screw conveyors in the bottom of the body to the hopper of the cement spreader trailing behind. The spreading machine, a product of the Link Belt Co., is equipped with a device for accurately controlling the quantity of cement deposited on the ground in a layer 3 ft. wide as the equipment moves forward at a speed of about 1½ mph. Enough cement is spread to form the mix for a 7½-ft. wide

*(Continued on page 124)*



**SCARIFIER FOLLOWS CEMENT SPREADER** and loosens soil to prescribed depth for subsequent mixing operation

**AFTER FIRST DRY-MIX OPERATION,** wet mixing is done using water from an accompanying tank truck. Note hose connection between the two units of equipment. Mixed soil-cement is left in windrow for spreading by blade grader.

### LIST OF EQUIPMENT

**used on a typical soil cement job where surfacing 4 in. thick was completed at the rate of 25,000 sq.yd. per 10 hr.**

- 3 Gardner mixers, made by the Gardner Mixer Co., of Redlands, Calif.
- 2 International cementers trucks (28-ton capacity), made by Fruehauf Trailer Co.
- 1 Cement distributor, assembled with Link-Belt equipment
- 1 Buffalo-Springfield 3-wheel roller, 12 ton
- 3 American Motor 3-wheel rollers, 12 ton
- 2 Pacific Truck Service water trucks
  - 1 capacity 3,300 gal.
  - 1 capacity 3,800 gal.
- 1 Caterpillar diesel motor grader
- 1 Allis-Chalmers motor grader
- 1 Killefer cultivator, 8 ft.
- 1 Allis-Chalmers round wheel tractor

### TABULATION OF SOIL-CEMENT BASE COSTS

**(Figures are for 25,000 sq.yd., 4 in. thick, placed in 10 hr.)**

| | |
|---|---|
| Compaction and rolling (Three 3-wheel rollers, 10 hr. each @ $6.50) | $ 195 |
| Compaction and rolling (One pneumatic roller, 10 hr. @ $6.50) | 65 |
| Water, 150,000 gal. @ $1.92/m. | 288 |
| Cement, 2,250 bbl. @ $3.20 (0.36 sack per sq.yd.) | 7,200 |
| Mixing, spreading and compacting 25,000 sq.yd. @ 8c/sq.yd. (bid price) | 2,000 |
| Curing seal, 25,000 sq.yd. @ ¼ gal. diluted (or 13 tons undiluted @ $31) | 403 |
| TOTAL | $10,151 |

Or unit cost of 40.6c per sq.yd.

**FINAL OPERATION (below)** consists of compaction of surface, first, with three-wheel 12-ton powered roller (in background) and, second, with weighted pneumatic-tired roller.

# SMALL TOOLS ON CONSTRUCTION

1

**1 PNEUMATIC TAMPER** consolidates fill replaced in pavement cut by employees of Southern California Gas Co., of Los Angeles. Goggles worn by men prevent eye injuries and steel toe guards protect feet.

2

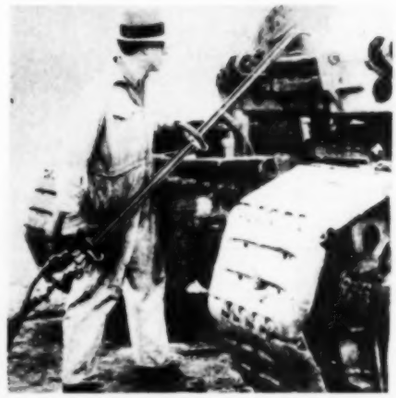
**2 GROOVING OR RAGGLING** mortar joints for tuckpointing and roof flashings, scoring concrete floors, cutting slate, tile, and other hard materials are some of jobs for which Wodack's electric wraggler is designed. Abrasive cutting wheels, 8-in. diameter, come in three thicknesses—1/8 in. for cutting, 3/16 and 1/4 in. for raggling. Cut may be set for any depth up to 2 in.

3

**3 DRIVING OF FORM STAKES** on 8-mi. concrete highway job near Stroudsburg, Pa., is speeded by use of Cleveland compressed air hammer. Contractor is Central Pennsylvania Quarry Stripping & Construction Co., of Hazleton, Pa.

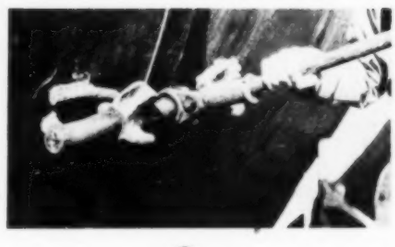
4

**4 WITH HYDRAULIC PUSHER,** 4-in.-diameter pipe is forced under paved street without necessity of making cut in surface. Operated by one man, this Greenlee 20-ton pusher, weighing 140 lb., consists of hydraulic unit with six operating speeds for varying soil conditions. As pressure is applied by pumping handles, unit moves forward on notched steel base against pipe clamp, forcing pipe through earth. Pushes of from 4 to 7 ft. can be made between pipe clamp changes.



5

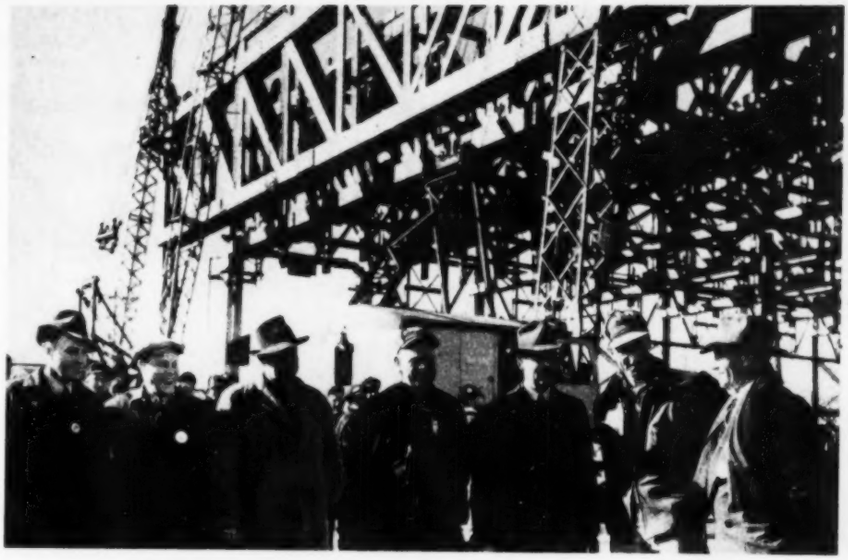
**5 STEAM CLEANING GUN** removes oil, grease, muck and grime from road-building and construction equipment, eliminating need for inflammable solvents or hand scraping and wiping. Oakite gun has automatic lift that raises cleaning solution from floor level to working height of 12 ft. without aid of pumps, motors or other auxiliary equipment. All that is needed to operate gun is 30 lb. or more of steam pressure.



6

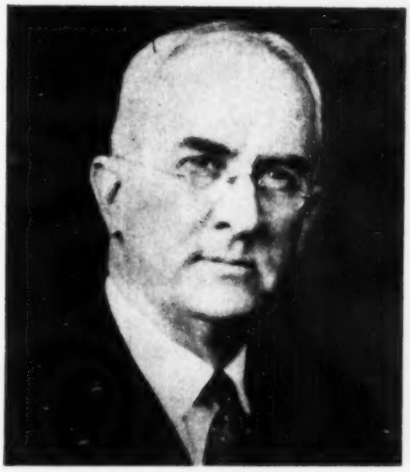
**6 PRELIMINARY TO WELDING,** this Simplex ratchet pulls together two sections of 15-ft. penstock pipe on Shasta Dam. Note U-shaped lugs that have been welded to pipe sections on either side of joint in positions where it is handy for jack fingers to take hold prior to pulling sections together.

# *Present and Accounted For* · · · A PAGE OF PERSONALITIES



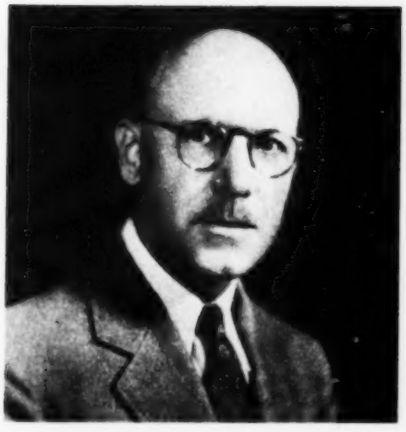
**SEVEN-MAN TEAM** of The Austin Co. **(right).** Engineers and builders, of Cleveland, Ohio, see final 150-ft. truss for world's largest timber factory building hoisted into place on Washington's birthday. Left to right are: BERT HELTNESS, superintendent; VINCE RICHARDS, rigger foreman; EDWARD YOUNG, superintendent; WALTER CARGILL, carpenter foreman; JOHN POORBAUGH, carpenter foreman; EUGENE GOODMAN, superintendent; R. B. KING, assistant general superintendent. All played leading roles in erection of framing for Chicago aircraft assembly plant, designed by The Austin Co. and built under supervision of U. S. Army Engineers for use of Douglas Aircraft Corp.

**F. J. MULVANEY, (below)** vice-president and active head of Davis & Stearns, Inc., general contractors of Whitesboro, N. Y., has been elected president of New York State Highway Chapter, Associated General Contractors of America.



**FREDERICK HALL FOWLER,** chief consulting civil engineer in Office of Chief of Engineers, U. S. Army, has been nominated for president of Society of American Military Engineers, which will hold its annual meeting in Washington, D. C., May 10. He served as director of American Society of Civil Engineers 1928-1930 and president in 1941.

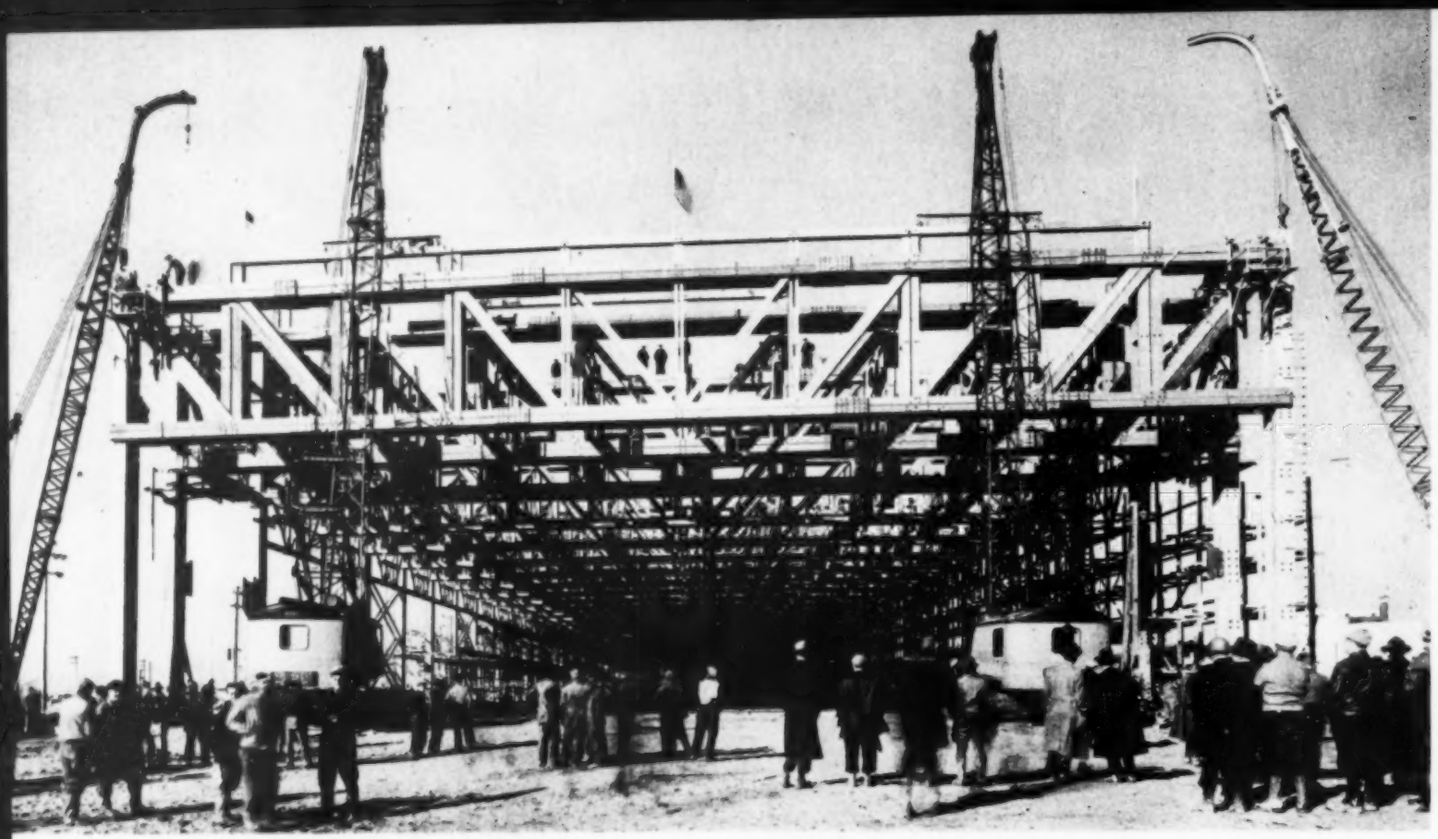
**SHIPYARD SUPERINTENDENT** for Dravo Corp., of Pittsburgh, Pa., is PADDY O'LAUGHLIN, who is here shown relaxing with cigarette after successful launching of LST (loading ship for tanks) and sub-chaser for Navy.



**HEAVY CONSTRUCTION DIVISION CHAIRMAN,** A.G.C., is ADOLPH TEICHERT, JR., president of A. Teichert & Sons, Inc., Sacramento, Calif., contractor for Guadalupe Dam, North Fork Dam, and for extensive work on California air fields.

**BUILDING DIVISION CHAIRMAN,** A.G.C., is PAUL FOGEL, president of Fogel Construction Co., Kansas City, Mo. This firm constructed Shrine Temple in Kansas City and has built numerous bakeries, power houses, and large high schools.

**HIGHWAY DIVISION CHAIRMAN,** A.G.C., is W. P. ROSCOE, president of W. P. Roscoe Co., Billings, Mont. Before forming his own company, one of state's leading highway and heavy construction firms, he had been 16 years with Security Bridge Co.



**WOOD TRUSSES OF 150-FT. SPAN,** weighing 70 tons, are erected over main assembly bay by long-boom crawler cranes equipped with goosenecks for handling lighter pieces.

**TOPPING OUT (below)** of huge structure occurs on Feb. 22 (Washington's Birthday) as colors are raised to mark erection of last timber truss of 150-ft. span set by riggers of The Austin Co.

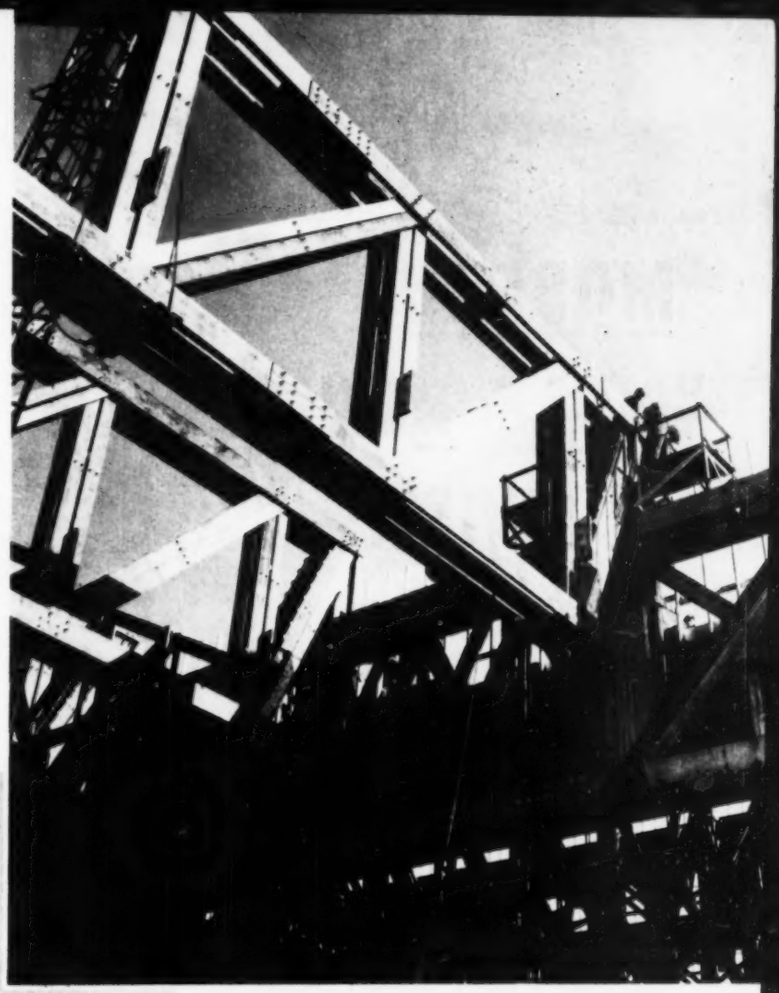
# *Timber Framework*

## Saves 30,000 Tons of Critical Metals In Building Huge Aircraft Plant

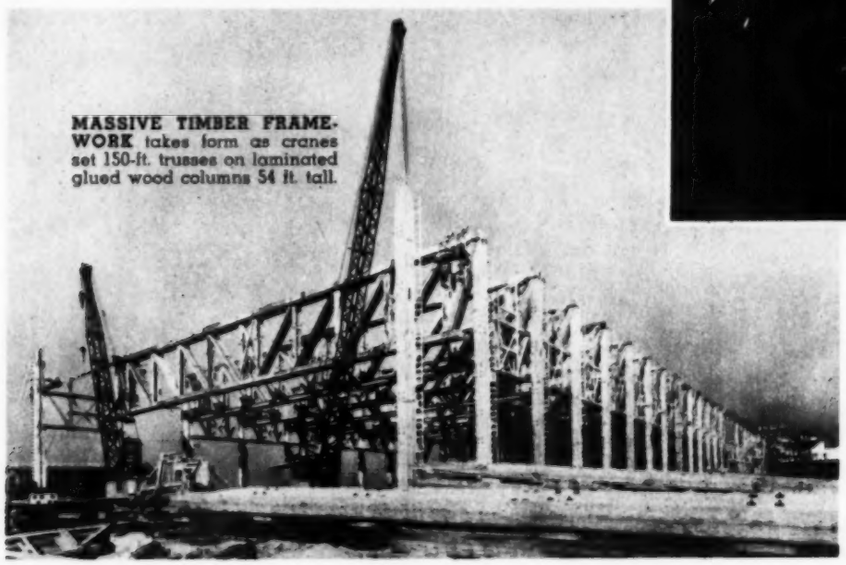
**DESIGNED TO SAVE** 30,000 tons of steel, copper and aluminum needed for use in ships, planes, tanks and other war essentials, the framework for what is claimed to be the world's largest factory of timber construction, where Douglas Aircraft Corp. will produce cargo transport planes, was completed Feb. 22, after The Austin Co., engineers and builders, of Cleveland, Ohio, had raised into place the last wood truss for the huge assembly plant in the Middle West. Built under the supervision of the Corps of Engineers, U. S. Army, for whom the Austin organization had previously designed mammoth windowless aircraft plants in steel and Fiberglas, this single daylight plant required 27 million board-feet of lumber and the fabrication and erection for the main assembly bay of wood trusses with spans of 150 ft. and weights of 70 tons. Erection of the trusses and columns was handled by long-boom gooseneck crawler cranes. At its peak the Austin payroll for the project included 8,500 construction workers, operating on a three-shift-per-day basis.

The massive wood structural frame alone saved 20,000 tons of steel. By the use of glued laminated wood columns it was possible to get along without large dimension lumber, which would have been practically unobtainable in the short time allowed for the completion of the building. The largest columns, 54 ft. long, consisted of two

*(Continued on page 122)*



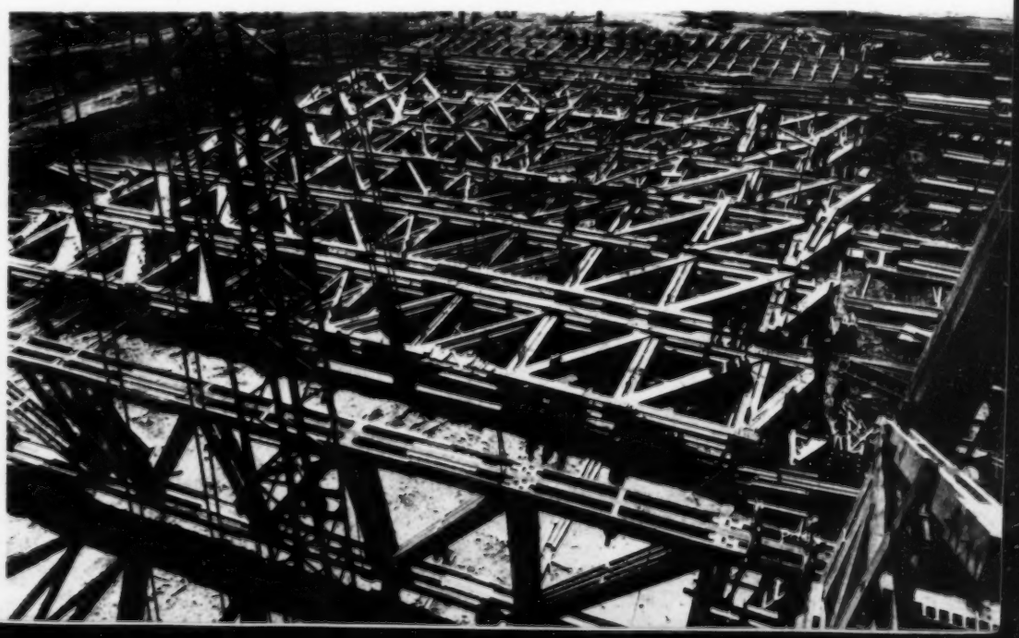
**HUGE JACK TRUSS** supports end of one of 150-ft. trusses spanning main assembly bay of aircraft assembly plant.



**MASSIVE TIMBER FRAMEWORK** takes form as cranes set 150-ft. trusses on laminated glued wood columns 54 ft. tall.

**FABRICATION OF TRUSSES (below)** on ground is here shown in successive stages, starting with layout of wood members in background and proceeding with framing and bolting operations.

**NIGHT AND DAY (below)** construction is carried on at top speed with peak payroll of 8,500 men working in three shifts per 24 hr.



# MODERN "MULE POWER" AT WORK

During the "E" award ceremony at Springfield, the men and women who produce Allis-Chalmers crawler tractors were told that a tractor was the first piece of equipment to land at Guadalcanal. Tractors and bulldozers cleared the way for mechanized troops. They repaired the airfield as fast as it was bombed and lengthened the runway so airborne supplies could be brought in. Said the army colonel who presided: "They will always be first to land in similar operations. No plane ever flew without a landing field—which the tractor helps build. No large gun could get into position without its prime mover—the tractor. Supplies and ammunition were never brought to the front without a road—and tractors build the roads. The tractor is the mule power of today's army."

Allis-Chalmers dealers, contractors and public officials can take pride in the part they have played in bringing this potent form of mobile power to its present state of development. They can be commended, too, for their willingness to step aside during this emergency in favor of the armed forces. Despite the fact that A-C crawler tractors are now being turned out in unprecedented quantity, few can be spared for non-military use.

It is imperative then that you safeguard your equipment vigilantly and keep it in good operating condition. Your Allis-Chalmers dealer is fully equipped to give you A-1 service on repairs, rebuilds or replacements. Today that is his greatest responsibility

**ALLIS-CH**

**TRACTOR DIVISION**

ARMY E NAVY

**The Army-Navy "E" for production excellence, awarded to Allis-Chalmers men and women, was the first such award for tractor production.**

**From the Illinois State Register, Springfield, Ill., January 9, 1943.**

## Drama Of Allis-Chalmers

Dramatically pointing to the Army-Navy "E" award pennant at the Allis-Chalmers tractor plant yesterday, Don Schweitzer, works manager, said:

"We will put more stars in that flag," and then gesturing toward the American flag at the opposite end of the platform, he added, "so we can keep the stars in that flag."

This illustrates the intense patriotism which marked the inspiring ceremony incident to the awarding of the Army-Navy pennant to the employees of the Allis-Chalmers plant for their excellent service on the production front of this war.

The addresses of all who spoke, including Walter Geist, president of Allis-Chalmers; W. A. Roberts, manager of the tractor division; Col. John S. Seybold, U. S. Army; Lieut.-Commr. W. J. Eden, U. S. Navy; Governor Dwight H. Green and Ray Downey, representing the employees, were all vibrant with intense patriotism.

But the most inspiring note of the significant occasion was that of complete unity expressed in the faces, the applause and the emotion of the vast audience of men and women workers.

President Geist and Col. Seybold sounded the keynote when they referred to the address of Commander-in-Chief Roosevelt to the Congress as a call to national unity which should inspire every real American to the maximum war effort.

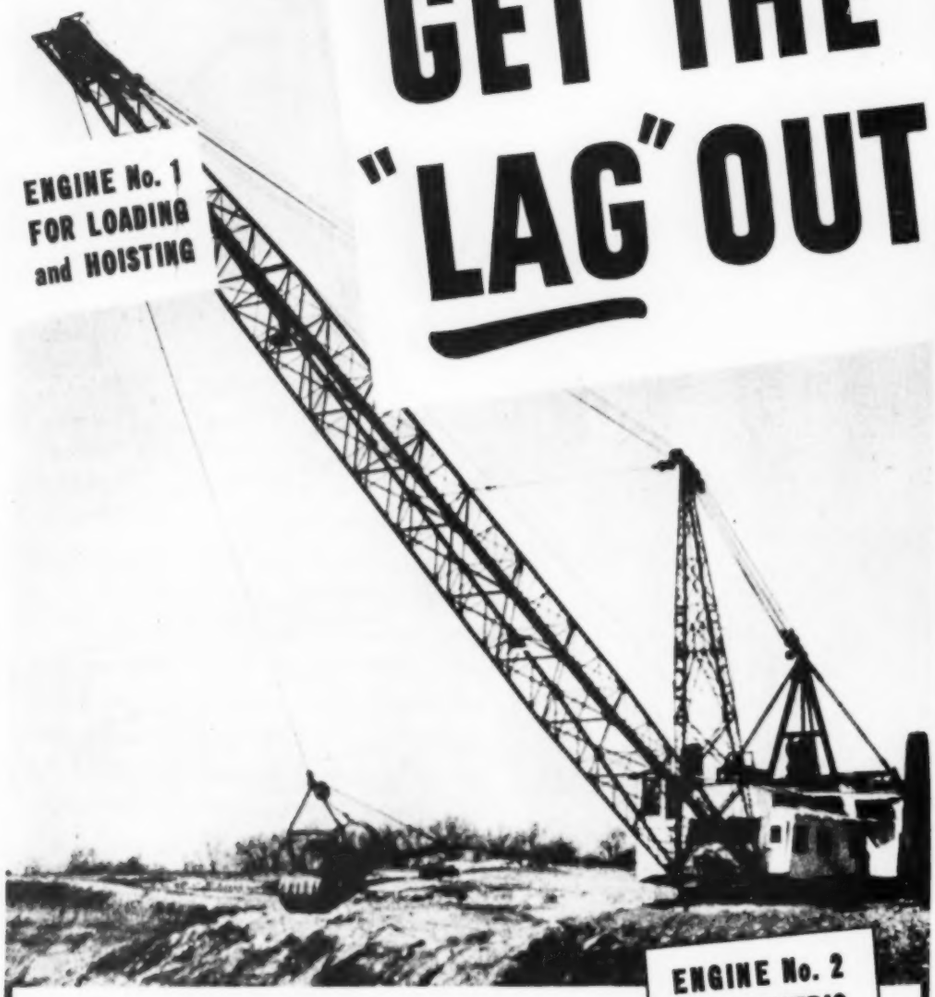
War energy, unity, production and the assembly lines at the local Allis-Chalmers plant dramatized so vividly in Springfield yesterday synchronize with the facts and figures presented by President Roosevelt to Congress and gave articulate expression to the fact that Springfield is in the front line of the irresistible forward march to victory.

The motif is patriotism—the inspiration is Americanism—the theme is optimism—the keynote, VICTORY THROUGH UNITY!

# CHALMERS

SION • MILWAUKEE, U. S. A.

# GET THE "LAG" OUT




## TWO ENGINES PROVIDE SMOOTH, STEADY POWER!

There's bound to be a "lag" at the instant when a SINGLE ENGINE is saddled with the combined load of Hoisting PLUS Swinging. Page gets this "lag" out by dividing the work of Hoisting and Swinging between TWO Compact, Horizontal Diesel Engines. The result is FASTER HOIST and FASTER SWING! Seconds are saved on every digging cycle . . . YARDAGE IS INCREASED . . . jobs are completed AHEAD OF SCHEDULE . . . America is made STRONGER!

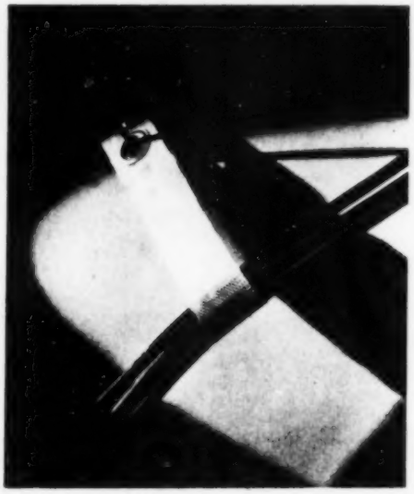
**PAGE**
• *Two-Engine* •
**DRAGLINES**

Today, PAGE Draglines are available for war work only. After Victory, PAGE Two-Engine Draglines will be available for EVERYONE WHO WANTS TO MOVE DIRT FASTER!

PAGE ENGINEERING COMPANY • CHICAGO, ILLINOIS


# CONSTRUCTION EQUIPMENT NEWS

**GLASS FIBER CABLE HANGER,** for use in mines, tunnels, shipyards and on construction projects, holds cables off floor and ground, preventing damage and consequent production delays. Cable strap is impervious to moisture and will not rot, stretch or shrink. Will support approximately 200 lb. Glass



fibers are protected and insulation value increased by heat-resisting varnish treatment. Standard size hanger is 14 in. long by 1½ in. wide. Metal grommet in each end permits nailing to wooden pillars. Straps are used to support cable, as shown, or can be wrapped around cable to prevent slippage. — **Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.**

★ ★ ★

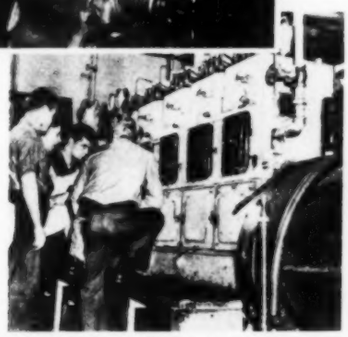
**NEW TYPE LIGHTWEIGHT, PORTABLE SHELTERS,** for use in arctic and designed to save critical materials, shipping space, weight and fuel, are made of laminated wood-frame construction covered with impregnated cotton fabric. They are 16 ft. wide by 8½ ft. high in center and may be used in any 8-ft. multiple of length. Heated by gasoline heaters.

Blankets of Fiberglas insulation are incorporated in walls and flooring, and while 200 lb. of this material is used in a 16x16-ft. shelter, it is estimated that weight of fuel needed for heating this structure will be reduced from 27,360 to 6,790 lb. Crew of 4 men can erect and dismantle one of these shelters in a minimum of time. When packed, unit occupies space less than 160 cu.ft. Longest dimension of unit is 8 ft. Sufficiently light and compact to be transported by air. — **James Manufacturing Co., Ft. Atkinson, Wis.**

# Mission Completed

ON ASSIGNMENT #30

**When the groups of Coast Guardsmen graduate from Hemphill Diesel Schools — they are ready to man and handle the Diesel Powered patrol boats that are death to our enemies and emissaries of mercy to those in distress during peace or war.**



***Above left:*** **Typical high-speed Diesel used for training at Hemphill Schools.** ***Above right:*** **Slow speed, heavy duty Diesels are included in the training program.**

**Electric generating plant operation and maintenance are thoroughly studied by Hemphill students.**

## HEMPHILL DIESEL TRAINING OF COAST GUARD AND NAVY PERSONNEL *is thorough!*

Theory, yes, but classroom instruction on the principals, design and structure of Diesel engines is augmented by *actual shop training*—learning how to make small parts and to handle pipe fitting, electric wiring, and other voyage repairs. Engines and training equipment in Hemphill Schools, parallels the tools, machines and engines in actual service.

In addition, the New York Hemphill Schools' "MS Brisbane," gives Coast Guard personnel in Training there actual experience on a Diesel-powered boat. They learn ship's telegraph and bell signals, engine operation and servicing under actual ship-board conditions, how to handle fuel transfer pumps, battery systems and other equipment.

**Marine, Generating and Stationary Power Plants** are an open book to Hemphill-trained men. Hemphill Schools in Los Angeles, Chicago, Memphis and New York are now running full capacity preparing men to handle Army, Navy and Coast Guard Diesel-powered equipment—training that is *vital now* and will be valuable to these men after the war when Diesels will again be put to work for peace time power on land and sea.

**Home Study Also Available**— If it is not possible for you to attend a Hemphill School, you can lay the foundation of a Diesel career with Hemphill's Home Study Course. Write today for complete information.

"It is gratifying, after many years of successfully training civilian Diesel operators, to be chosen by the Government to assist in the important task that lies ahead."

Ralph Hemphill — Chairman of the Board and Founder

# HEMPHILL SCHOOLS, Inc.

**3128 QUEENS BOULEVARD, LONG ISLAND CITY, NEW YORK**

**Hemphill Diesel Schools also located at**

| CHICAGO | LOS ANGELES | MEMPHIS |
|---|---|---|
| 515 So. Western Ave. | 1601 So. Western Ave. | 421 Monroe Ave. |

***AMERICA'S ORIGINAL EXCLUSIVE DIESEL TRAINING INSTITUTION**

# NATIONWIDE *Service*

★ ★ TO CONSERVE

## *the Nation's Trucks*

Across the length and breadth of America, there are more than 2,200 GMC Service Stations . . . life-saving stations for our vital motor trucks. While General Motors Truck dealers still have new trucks to sell to qualified purchasers, their main job is to keep trucks on the job. They are well equipped to do this for three very good reasons. First, they are truck service specialists. Second, they provide original Preventive Maintenance Service. Third, they are backed by a factory Civilian Truck Service Department having an intimate knowledge of the commercial truck operator's parts and service needs. Make the most of GMC's nation-wide service to conserve your trucks for the nation.

*Special "Service Payment Plan" available through our own YMAC*

Pledged U.S. TRUCK CONSERVATION CORPS

GMC VICTORY MAINTENANCE KEEPS YOUR TRUCK ON THE JOB

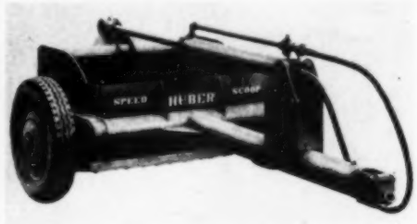
INVEST IN VICTORY . . . BUY BONDS AND STAMPS

*THE TRUCK OF VALUE*

**GMC TRUCKS**

**GASOLINE • DIESEL**


**SMALL SCRAPER UNIT,** designed to meet need for scoop for use in highway, street and airport maintenance, is being used in many parts of world for repairing bombed runways at landing fields and highways affected by bombing attacks. Built in two sizes — for operation with 20- to 30-hp., or 35- to 50-hp. tractors. Speed scoop is said to be three to



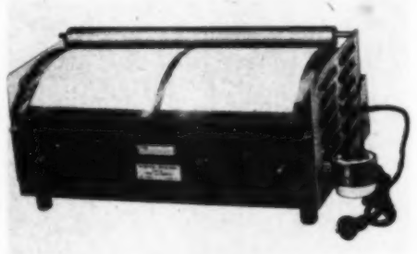

six times as fast as larger scrapers and requires but one man to handle it efficiently. Simple method of operation assures full load each time. Loading is accomplished with easy rolling movement of earth which reduces drawbar pull. Simple hydraulic cylinder controls scoop and its blade adjustment to earth. Hydraulic ram action makes it possible to dump earth in one pile and spread it to any desired thickness. Backfilling, shouldering operations, dumping in odd corners and over embankments can be accomplished accurately, according to manufacturers. — **The Huber Manufacturing Co., Marion, Ohio.**

★ ★ ★

**CLEAR CONCRETE CURING MEMBRANE** marketed under name, "SealKure," does away with need for burlap, straw, cotton pads and dirt. Applied as soon as surface water sheen has disappeared. "SealKure" ingredients have no tendency to separate. It is easily sprayed with either manual or power-operated equipment and contains an inert, fading dye which marks areas treated, thus avoiding repetition and waste. Coloring dye disappears over a short period. Moisture retention factor 98 percent plus. Recommended coverage for efficient curing is 200 sq.ft. per gal. Available in 55-gal. drums. — **Lyons & Rood, 821 W. Manchester Ave., Inglewood, Calif.**

★ ★ ★

**PORTABLE, TABLE MODEL PRINTING MACHINE,** said to be practical, fast and low in cost, makes blue prints or black and white prints in half a minute. Exposure time is frequently as little as 20 sec. Developing time for black and white print is 10 sec. Can be plugged into any standard electric outlet. Ex-



tremely easy to operate. Comes in two sizes for prints up to 12x18 and 18x24 in. Illustration shows 12x18-in. Spee-Dee printer with two 8x11-in. prints inserted. Actual printing surface is oversize on both machines, preventing crowding of prints, overlapping or blurred edges. Printing on blurred surface gives adequate contact without inconvenience of wrapping prints around cylinder. Tracings, drawings, letters, invoices or any written or printed matter may be duplicated quickly and clearly on prints that cost less than 1½c per sq.ft. — **Peck & Harvey 4325 Addison Ave., Chicago, Ill.**

# On Big Jobs Like These

## Black & Decker Electric Tools Save Time for War Contractors

### Timely Tips for Contractors

- **Keep your equipment in good shape.** Well lubricated, oiled, cleaned. Check it regularly. New tools are hard to get.
- **Know your tools** and have your men know them better. Send for these Black & Decker new "Know How" handbooks on proper care and use of electric tools.
  - ☐ **Hammer Handbook**
  - ☐ **Saw Handbook**
  - ☐ **Proper Use & Care of Drills**
- **Throw idle scrap metal,** old tools, obsolete equipment into the fight. Uncle Sam needs it now. GET IN THE SCRAP WITH YOUR SCRAP.

IN THE ILLUSTRATIONS above you see two sound reasons why war contractors pick Black & Decker Portable Electric Tools to help them meet construction deadlines.

On the left you see a workman operating a powerful Black & Decker Electric Hammer in a gigantic Midwest apartment housing project. These hammers were used by the plastering contractor to drill holes for fastening 520,000 running feet of metal base and 60,000 clips to ceilings and floors. The contractor figured these hammers cut drilling time in half on nearly 500,000 holes and saved approximately 2100 man-hours on the entire job.

On the right you see a workman at a huge northwest army cantonment project speeding up heavy duty cutting of split ring grooves with a Black & Decker Drill mounted on a B & D Drill Stand. In addition to such jobs, other heavy duty Black & Decker Drills were used in the fabrication of heavy timber roof trusses . . . and they sliced man-hours tremendously.

On all kinds of war construction work, husky Black & Decker Portable Electric Tools do jobs *faster* and *better*, require less man power to do them. Contractors prefer Black & Decker Tools because they can be bought *on the job* from nearby distributors. They like them because there's a Black & Decker Factory Branch close at hand, always ready to provide quick, expert service. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

**Black & Decker**

**PORTABLE ELECTRIC TOOLS**

Save Metals . . . Speed Wire Rope Work . . With a

FIST-GRIP

**The "Fist-Grip" Clip Has 3 Strikes on Hitler**

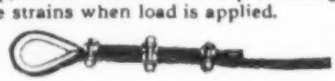
**Saves accidents** — can't be put on wrong; doesn't weaken rope; greater holding power.

**Saves metals** — 25% fewer clips do the job better; no crushed rope ends; flush nuts — no battered threads.

**Save time** — fewer clips to put on; nuts on opposite sides tighten easier, faster with any type wrench.

Greater holding power with 25% less clips!

**"Finger-Pinch".** U-bolt clips unavoidably crimp, distort and bow wire rope, causing reverse strains when load is applied.



**"Fist-Grip".** Fewer Safety Clips hold rope straight in smooth, vise-like grip, with no protruding threads to get battered in use. Clips and rope can always be used on the next job.

*Distributed Through Mill Supply Houses*
*Look for Laughlin Products in Thomas' Register*

THE THOMAS LAUGHLIN Company
PORTLAND, MAINE

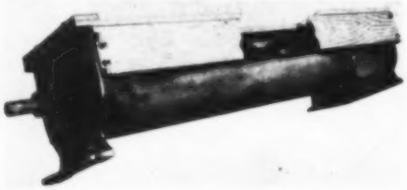
**SELF-ADJUSTING RODS,** called "Batsys," fireproof and rat-proof, are used for holding insulating wool in place in homes and other buildings. As shown in accompanying illustration, "Batsys" are bars of gypsum attached to framing to hold the wool in place. They can be adjusted to 16- or 24-in. centers, or variables thereof. —**Insulators Supply Co., Stanton Ave., Cincinnati, Ohio.**

★ ★ ★

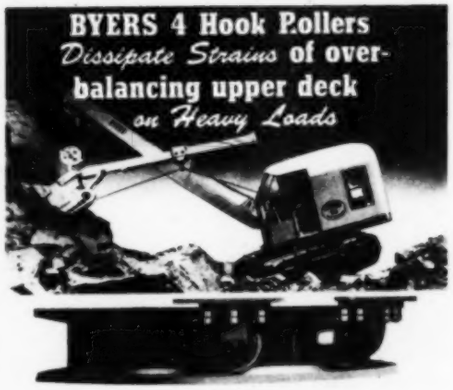
**STATIC CONDUCTIVE LINOLEUM** designed to overcome hazards of static electricity in presence of vapors from combustible substances and dust from explosives or from any substance which combines with oxygen, is said to be non-sparking and highly conductive of static and yet to provide adequate protection against accidental grounding from service voltages. Produced especially for use on floors and tables in powder and loading plants, it also is useful in areas where solvent vapors or dust constitute fire hazards. Characterized by high wear resistance, flexibility, resilience smoothness and freedom from cracking. Available in standard 6-ft. widths. May be washed frequently, does not slough off or buckle under ordinary conditions. Said to be unaffected by ordinary solvents such as alcohol, ether, petroleum derivatives, acids and the like. Freedom from brittleness prevents cracks that would create isolated undergrounded areas or harbor explosive material. —**Congoleum-Nairn, Inc., Kearny, N. J.**

★ ★ ★

**STEEL-SAVING SCREW CONVEYOR TROUGH** is made with steel trough bottom, wood sides, and wood cover board, lag-screwed together to form complete, tight inclosure for screw and material it conveys. Substantial percentage of steel is saved compared to all-steel trough and cover plate heretofore furnished. Adapted to all standard screw conveyor fittings, will readily connect with existing steel trough and can be shipped with sides and bottom assembled. Curved bottom is of No. 10 gage steel and may be removed during cleaning operations by loosening lag screws which secure it to wooden trough sides.—**Link-Belt Co., 2410 W. 18th St., Chicago, Ill.**




BYERS 4 Hook Rollers *Dissipate Strains* of over-balancing upper deck *on Heavy Loads*



The development of hook type rollers for rotating the upper deck of shovels and cranes immediately made obsolete the old fashioned conventional rollers and center pin construction. The engineering principle of hook rollers is sound — dissipation instead of concentration of strains of an upper deck that is overbalanced by reason of heavy loads carried.

Likewise, four hook rollers are better than three for they distribute stresses over twice the area of three rollers.

Byers uses four hook rollers.

Specify BYERS CRANES and SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

*To make your equipment*

**WORK BETTER WORK LONGER**

. . . to get it back in service on war projects, state and county highway and other construction jobs FASTER, remove oil, grease and muck before overhaul, repair or repainting the EASIER, SPEEDIER Oakite way with

**OAKITE CLEANING MATERIALS**

Whether used in repair shop tanks or applied with the Oakite Solution-Lifting Steam-Detergent Gun, these FAST-WORKING materials save time, conserve manpower, hold down maintenance costs. FREE booklets give details. Write TODAY!

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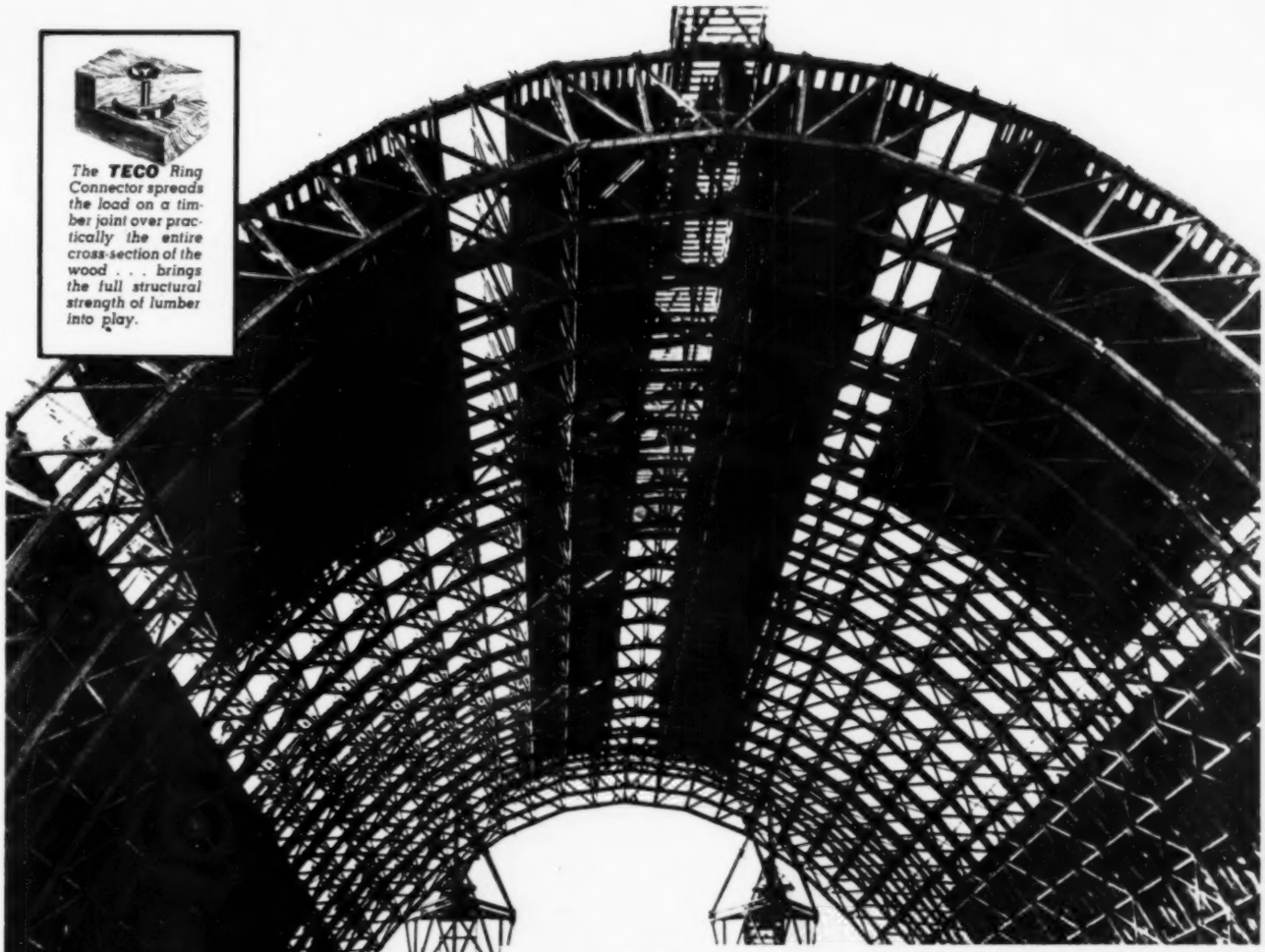
24G Thames Street, NEW YORK, N. Y.
Representatives in All Principal Cities in the U. S. and Canada

*The* **TECO** *Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*



# OUR NAVY BUILDS WORLD'S GREATEST TIMBER STRUCTURE

*mammoth blimp hangar was made possible by*

## TECO CONNECTOR ENGINEERING

*New Navy Blimp Hangar, 1,000 feet long; 153 feet high; clear-span roof 237 feet. Timber treated for fire resistance according to Federal specifications. Trusses prefabricated by Timber Structures, Inc., Portland, Oregon.*

Two announcements of the widest import to American engineering have just come out of Washington.

The U. S. Navy has announced that a giant blimp hangar, engineered entirely in timber, is nearing completion "somewhere in the continental United States."

The War Production Board has announced that "such a structure could not have been built of wood by ordinary methods without the use of timber connectors . . . The steel ring timber connector, which is used to increase the strength of joints in wood construction, saved more than 400,000 tons of steel for essential war production in 1942." WPB added that 2,050 tons of structural steel will be saved in this hangar alone.

In erecting this vast, multiple-truss assembly, Navy engineers have accomplished a notable achievement in modern timber connector engineering. The hangar is the latest of scores of large Navy, Army, and Maritime Commission projects built with Teco timber connectors under the revolutionary Teco system of timber engineering. It is one of *over 100,000* heavy-duty structures, of *over 600* types, built under the Teco connector system in the past few years. They include clear-span factories, bridges and trestles, towers, tanks, warehouses, docks, shipyards, and many others.

Write today for our FREE Reference Book for engineers and architects showing 45 *"Typical Designs of Timber Structures."*

**TIMBER ENGINEERING COMPANY**

NATIONAL MANUFACTURERS OF **TECO** TIMBER CONNECTORS AND TOOLS

**WASHINGTON, D. C.** **PORTLAND, OREGON**

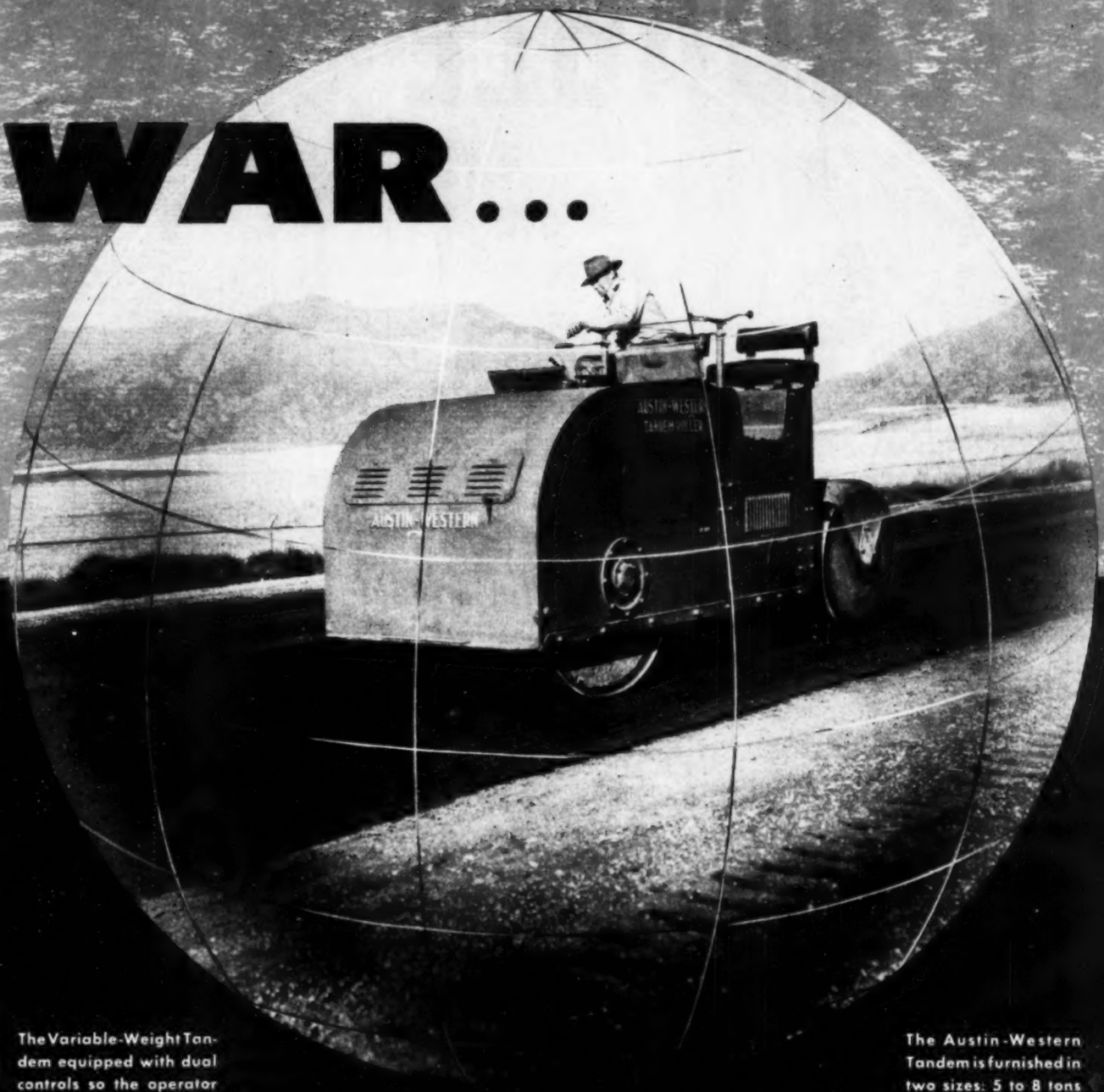
# Waging a GLOBAL

**. . . IS AN IMMENSE TASK,** but fortunately tools that contribute to our convenience, comfort, and safety during peace, can be used to stamp out aggression. Take rollers like these, which for decades have seen service on every continent of the globe. They've had plenty of preliminary training in wild jungles, desert areas, up in the mountains and where it is cold. They've served where road building techniques vary and where materials of every description were handled in stride. When war was declared, they were "seasoned and ready"—now they are busy on the "routes to Berlin and Tokio". . . . After victory, we will again have ready for our regular customers the most practical and finest operating units available. Till then, owners of our equipment will receive the best possible attention. Austin-Western's DISTRIBUTORS, thruout the United States and in other countries, are maintaining facilities and a stock of parts to give prompt and efficient service *whenever and wherever it is needed.* THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois, U.S.A. Distributors in Principal Cities. Cable Address: AWCO, Aurora.

The Cadet is furnished in 6, 7 and 8-ton sizes.

The Autocrat comes in 10 and 12-ton weights.

# WAR...




The Variable-Weight Tandem equipped with dual controls so the operator may work on either side.

The Austin-Western Tandem is furnished in two sizes: 5 to 8 tons and 8 to 10½ tons.

BUILDERS OF ROAD MACHINERY

# Austin Western

SINCE 1859

Austin-Western also builds Power Graders, Shovels and Cranes, Street Sweepers and a complete line of Rock Crushing and Screening Plants and kindred equipment.

# DEPENDABLE

DEPENDABILITY SEAL OF Service Proved QUALITY PERFORMANCE

*This seal is found ONLY on Blackhawk Jacks — your assurance of a wise and safe investment.*

IT'S the more-for-your-money value built right into Blackhawk Hydraulic Jacks that makes them so downright dependable. They're rugged, tough, powerful; handle all jobs as they come — fast, smoothly, safely. That's why you need dependable Blackhawk Hydraulic Jacks to lick many tough wartime emergency problems of lifting, lowering, pushing, bending, testing, as well as everyday construction and maintenance jobs. Every construction engineer, foreman and maintenance man should know about MODERN Blackhawk Hydraulic Jacks, available in capacities of 3, 5, 8, 12, 20, 30 and 50 tons. Write for new Bulletin V-43 — or see your Blackhawk Distributor.

*A Product of* **BLACKHAWK MFG. CO.**
DEPARTMENT J2343 • MILWAUKEE, WISCONSIN

BLACKHAWK MFG. CO.
Department J2343,
Milwaukee, Wis.

Please rush Blackhawk Hydraulic Equipment Bulletin V-43.

Name.....

Firm.....

Address.....

**BLACKHAWK**
WORLD'S LARGEST MANUFACTURER OF HYDRAULIC JACKS

**PORTABLE, HIGH-PRESSURE ACETYLENE GENERATORS** for welding, cutting, soldering and brazing, has four outstanding features, according to its makers: (1) Absolute automatic control obtained by displacement method; (2) uses "lump" carbide (3½x2-in.) which is cheaper and gives 50 percent more acetylene gas than rice carbide; (3) automatic control feature eliminates hand operations of pressure and safety valves; even unskilled workers can handle this unit; (4) can be used with any torch, high or low pressure, for cutting and welding, also for soldering without oxygen. Two convenient sizes: Model No. 12, load capacity 12 lb. or 90 cu.ft.; Model No. 25, load capacity 25 lb. or 200 cu.ft. Priorities required.—**Adler Mfg. Co., 1440 N. 4th St., Milwaukee, Wis.**

★ ★ ★

**WATER-PAINT FOR WALLS,** called Techide, is made from synthetic resins, oils and quality pigments. Easy to apply with ordinary calcimine brush on wall paper, plaster, wallboard, old painted surfaces, cement, brick and casein painted surfaces. Afterwards, brush can be cleaned quickly and easily with water. Said to be quick drying, rooms being ready for occupancy same day they are painted. Dries in 1 hr. and permits second coat in 3 hr. Washable; ordinary dirt, finger prints and pencil marks easily removable. Proper reduction of Techide is ½ gal. of water to 1 gal. of semi-paste. Depending on surface to be painted, coverage ranges from 400 to 1,000 sq.ft. per gal. Variety of colors: ivory, silver gray, sunny yellow, dusky rose, light buff, mist blue, sun tan, cool green and white.—**Pittsburgh Plate Glass Co., 2000 Grant Bldg., Pittsburgh, Pa.**

★ ★ ★

**PLASTIC HOUSING ELECTRIC DRILL** (Thor model), said to provide not only greater strength and protection from shock, but more power per pound, is available in three speeds, 2,500 rpm., 3,750 rpm. and 5,000 rpm. Weight, 3 lbs. 3 oz.; length, 8 3/16 in.; heavy-duty drilling capacity, ¼ in. Plastic "armor" or housing does not support any of operating parts, but serves simply as protective shell.

Bearings, gears, stator, centerplate and other internal power unit parts are supported within sturdy inner metal skeleton frame which insures close tolerance in alignment of these parts. Plastic field case, gear case and grip handle. Field case slides over frame and is held in keyed position against metal centerplate. Locked by grip handle which slides over end of skeleton frame and is locked to it by screws. Gear case is held in position with metal protection nut threaded directly to frame and locked against centerplate. Inside frame are heavy-duty motor, over-size fan to provide abundant ventilation and over-size pitch alloy steel gearing for efficient power transmission.—**Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.**

*Here's the kind of*

# PREVENTIVE MAINTENANCE
## THAT KEEPS SCRAPERS ROLLING!

YOUR present 4-Wheel Scrapers will probably have to last you for the duration . . . and they'll have to stand up under the punishment of wartime high-speed 3-shift service. That makes the job of maintenance more important than ever before because even the best equipment requires a regular program of servicing, preventive maintenance and overhaul. Here are a few "pointers" to help keep your scrapers rolling at top efficiency!

YOUR International TracTracTor Distributor is equipped to do a service job as never before to help you prolong the useful life of your equipment.

## *Read this* CHECK CHART

**1.**

Check tires regularly and keep them inflated exactly as recommended by the manufacturer.

**2.**

Lubricate regularly using good grade lubricants and following the manufacturer's instructions carefully.

**3.**

Inspection should be regular routine and every effort made to locate and correct troubles before they become serious.

**4.**

Repairs should be made promptly and with special care so that the original strength and efficiency of the entire unit will be maintained.

**5.**

Don't let cutting edges wear down too far or lip castings will be weakened.

**6.**

Keep rub-plates built up and hard-faced to protect lip casting.

**7.**

Disassemble and clean the sheaves regularly to prolong the life of the bearings, pins and other parts.

**8.**

Check all cable leads to see that ropes are properly aligned to prevent undue rope wear.

**9.**

If a sheave-stand is bent, straighten it before the off-lead damages or cuts the cable.

**10.**

Save cable by avoiding unnecessary stress. Do not travel with ejector, apron or bowl hoisted to extreme height.

BUCYRUS ERIE
TRACTOR EQUIPMENT

SEE YOUR
**INTERNATIONAL TRACTRACTOR**
DISTRIBUTOR

## YOUR TUNNEL LINER Is a "Patriot" Too

PHOTO BY U. S. ARMY SIGNAL CORPS

Old familiar friends have taken new shapes and gone to war. Now ARMCO Tunnel Liner Plates can be purchased only for the most vital war-time projects.

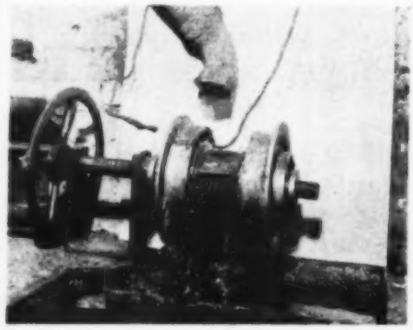
Where metal tunnel liner *must* be used, ARMCO Plates are doing their part and more. They save precious metal because gage for gage this heavy duty liner is stronger (section modulus) than any other plate. Less metal is required to do the work. When completed rings can be spaced to take advantage of partly self-supporting ground, fewer plates may actually be used. Work moves fast; for one man can handle and assemble the light sections with structural wrenches.

If you cannot get ARMCO Tunnel Liner Plates, remember the steel is going into tanks, guns and ships—helping to win battles. After the war these rugged liner plates will be back, to help you cut costs and speed tunnel work. Armco Drainage Products Association, 245 Curtis Street, Middletown, Ohio, U. S. A.

ARMCO

**TUNNEL LINER PLATES**

**ROLLER WELD ELECTRODE,** specially developed for building up track rollers, rails and other similar parts of machines subjected to combination of impacts and heavy bearing wear, is characterized by rapid burn-off, smooth operation and uniform deposit of



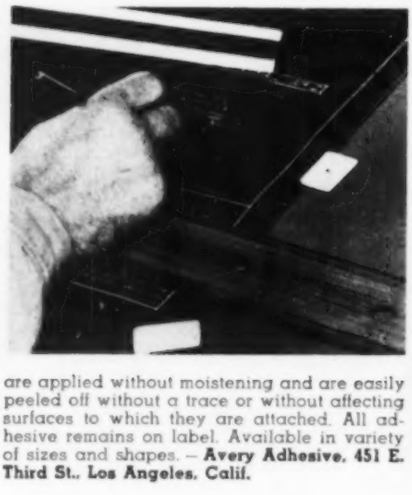
highly alloyed, tough, hard surfacing metal which is sufficiently soft in as-deposited condition to be ground according to best practice employed in rebuilding track rollers. Operates with greatest efficiency on reverse polarity with dc. welding machine. Rod is available in black and comes 14 in. long, in diameters of 5/32, 3/16 and 1/4 in. Thoroughly field tested.—**R. G. Le Tourneau, Inc., Peoria, Ill.**

★ ★ ★

**TRAFFIC MARKING PAINT** which gives street and floor markings of unusual permanence and visibility is formulated on synthetic principles and is already in use in leading industrial plants, municipalities, airfields and parking lots. Applicable on wood, stone, asphalt, wood blocks, composition and cement. Does marking job in one coat. On creosote blocks special primer is furnished to prevent bleeding. Dries for traffic in 20 to 30 min., eliminating extended work stoppage. Applicable by lining machine or hand brush, leaving clean, scuff-proof line or letter. Said to be durable under automobile, machine or foot traffic and to be unusually resistant to stains. Reduces labor costs involved in frequent repaintings and ordinary marking paints. Available in white, yellow and special shades to order. Shipped in 55-gal. drums and 5-gal. kits.—**Thomson-Porcelite Paint Co., 829-35 N. Third St., Philadelphia, Pa.**

★ ★ ★

**STICKERS** for attaching drawings and blueprints to drawing boards eliminate necessity of moving T-square over thumb-tack heads. Paper thin, Kum-Kleen stickers will lie flat,



are applied without moistening and are easily peeled off without a trace or without affecting surfaces to which they are attached. All adhesive remains on label. Available in variety of sizes and shapes.—**Avery Adhesive, 451 E. Third St., Los Angeles, Calif.**

***And Salvage Waste Lumber***

***For Bracers • Spreaders • Stoppers***

**This powerful, fast-cutting MALLSAW reduces form construction to a few simple operations. It assures perfectly square board ends, eliminating fins and projections. It permits a carpenter to gang and cut boards for entire section at one time. It does away with awkward hand sawing below grade as boards cut to size can be passed to the man in the trench faster than he can nail them in place. And, in addition, it enables contractors to use small ends and pieces ordinarily discarded.**

**MALLSAWS are balanced for safe, one-hand use, easily and quickly adjusted for depth and bevel cuts to 45 degrees, simple and easy to use. A Big time and labor saver for War Projects.**

***Write AT ONCE for literature and prices.***

★★ ***THROW YOUR SCRAP INTO THE FIGHT***

**MALL TOOL COMPANY**

**7757 South Chicago Ave., Chicago, Illinois**

**GRIFFIN**

**GRIFFIN**

**WELLPOINT SYSTEMS**

**JETTING PUMPS**

**FOR SALE RENT**

***Prompt Shipments***

**Send for our New 60 page illustrated catalog**

**"GRIFFIN POINTED WELLPOINT FACTS"** chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

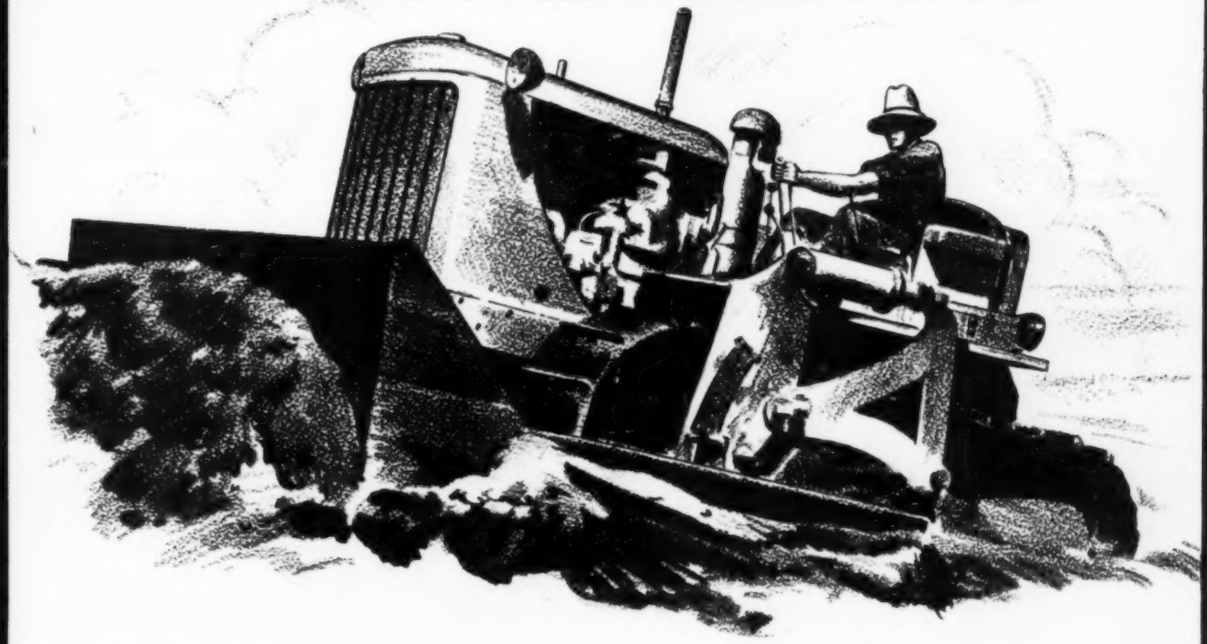
**GRIFFIN WELLPOINT CORP.**

**881 EAST 141st ST. • NEW YORK, N. Y.**

**Phones: MElrose 5-7704-5-6**

# Save Time 4 Ways

## ON WAR-RUSHED JOBS!



**WHEN YOU BUY FROM SOCONY-VACUUM, ONE OF THE WORLD'S GREATEST ORGANIZATIONS WORKS FOR YOU—WITHOUT EXTRA CHARGE!**

You Get: 1. Quality Lubricants which help increase the reliability of your machines. 2. Expert help on maintenance schedules. 3. Specialized Lubricants for unusual applications. 4. Lubrication engineers on call—to help you with special problems!

## DELVAC "900 SERIES" OIL

### saves precious time for you!

This well-proven oil is an example of how Socony-Vacuum research scientists *work for you*—to help reduce maintenance costs and "out of service" time!

Delvac "900 Series" is recommended for both heavy-duty carburetor-type engines and *all* high-speed Diesels.

It resists to *an extreme degree* the formation of oil-oxidation products—"varnish," "lacquer," gum, sludge! It has *special detergent properties* which reduce engine deposits!

It resists excessive thinning under heat—helps protect hard alloy bearings!

The result is clean, fully lubricated engines—low costs, minimum delay for you.

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Co., General Petroleum Corporation of Calif.

**Mobilgas**

SOCONY-VACUUM

**SOCONY-VACUUM FUELS LUBRICANTS AND ENGINEERING SERVICE**

# FORM-TY ENGINEERING FACTS

*Factors other than the Tie itself, govern the final cost of Ties in the wall.*

## COMPARISON DATA

| SYSTEM | TIE | Safe Load | Tie Length | Weight per Unit | | | Cost per Unit | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Tie Only | Working Parts | Total | Tie Only | Working Parts | Total |
| Prefabricated | ½" Tyscrus | 6000# | 10" | .34# | 2.94#* | 3.28# | $.08 | $ .31 | $ .39 |
| | A.C.Form-Tys | 3000# | 29 1/16" | .38# | 1.73#‹ | 2.11# | $.05 | $ .18 | $ .23 |
| | Snap-Tys | 3000# | 29 1/16" | .38#§ | 1.44# | 1.82# | $.05 | $ .14 | $ .19 |
| Field-Assembled | Band Iron | 1500# | 36" | .39# | .86#† | 1.25# | $.03 | $ .20 | $ .23 |
| | ¾" Rod & Clamps | 5000# | 36" | 2.0# | 3.62#† | 5.62# | $.08 | $ .60 | $ .68 |
| | ⅝" Tilt Lock | 5000# | 10" | .32# | 8.5#† | 8.22# | $0.325 | $1.45 | $1.4825 |

§ Includes built in spreader unit.
‹ Includes Spreader Plates for Form Spreading.
† No provision for spreading forms.
* Includes Tycones for Form Spreading (Opt.)

Weight; the number of ties required; investment and depreciation on working parts; erecting and stripping time; labor required for "on the job" preparation; safety margins which must govern operating schedules—these determine the cost of your concrete form work. With Richmond's Form-Ty Engineering you get specific advantages in every one of the above-mentioned items. The comparison data shown above gives you an idea. For instance, why pay 68c when 38c is enough? Reach for your Architects or Engineering File and get the whole story in Richmond's Form-Ty Engineering Guide. Or, write us for your individual copy. Better still, let us look at your job plans and give you exact figures.

*It May Pay You to Tear Out This Ad and Save It!*

SEE OUR CATALOG IN SWEET'S

**RICHMOND SCREW ANCHOR COMPANY, INC.**
816 LIBERTY AVENUE • BROOKLYN, NEW YORK

TIME AND LABOR SAVING CONSTRUCTION DEVICES FOR CONCRETE CONSTRUCTION


**EYE PROTECTION GLASS,** known as Didymium Noviweld, permits welders to pierce blinding glare and see welding operations from beginning to end, thereby increasing production. Lenses made of new glass possess all ray-absorptive properties of Noviweld glass plus special characteristics of Didymium,

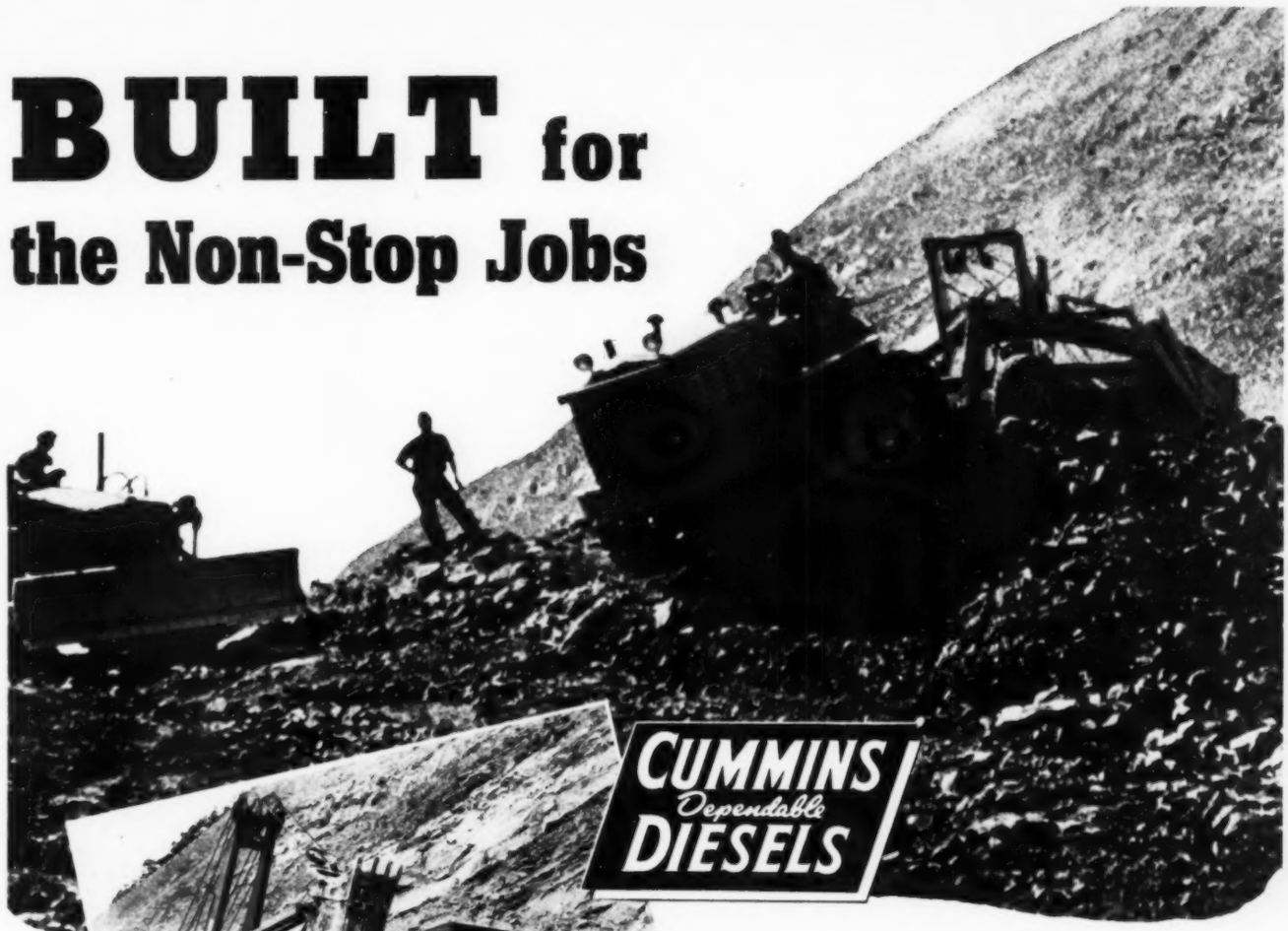
combination of elements with high absorption in that particular portion of visible spectrum where "flux-flare" normally obstructs clear vision. These lenses cut down high indensity sodium rays of fluxes, enabling flame workers to see molten area more clearly and thereby step up efficiency in every phase of welding operation, particularly flame welding of aluminum and steel. Lenses also protect eyes by absorbing invisible ultra-violet and infra-red rays generated during welding. Three shades available, 4, 5 and 6 corresponding with shade numbers of standard Noviweld lenses.—**American Optical Co., Southbridge, Mass.**

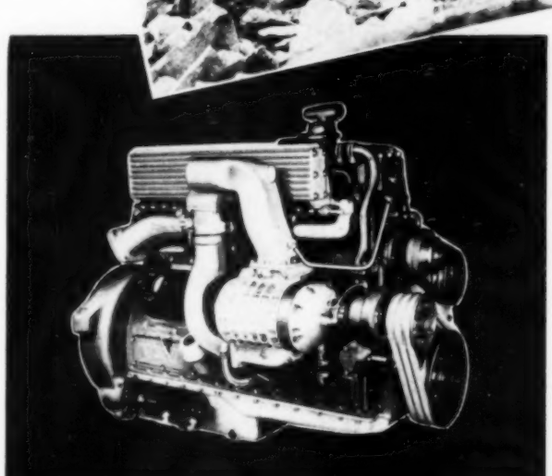
★ ★ ★

**POST-HOLE DIGGER** called "Speedigger," may be mounted on any standard tractor with four bolts and is driven by regular tractor belt pulley. Digs hole any depth up to 40 in. Comes equipped with 9-in. auger, with 5-, 6-, 7-, 10- and 12-in. sizes available. Drills on any grade on which tractor will operate and at any angle up to horizontal position. Absence of complicated mechanism and complex levers makes digging easy. One adjustment spaces

holes evenly, as little as 3 ft. apart. One bolt changes augers. When tilted back in transport position on tractor, Speedigger can be driven into any regular size tractor shelter for storage. Besides digging post holes, it removes temporary or rotted posts quickly and easily. Holes for corner posts and oversized holes may be dug speedily by running down three holes in one setting. Digs signpost holes, slanting holes for temporary fence and sounding holes for highway bridges.—**Equipment Sales Co., 627 State St., Madison, Wis.**

# BUILT for the Non-Stop Jobs





*Above*: Model HBIS-600 (supercharged) Cummins Dependable Diesel. 200 hp. at 1800 rpm. There's no need to sacrifice more weight and space for extra power . . . supercharging gives you the additional horsepower needed in the same dimensions and with very few changes in your service parts requirements.

Time means more than money today. Time means victory. That's why every hour is a working hour on the nation's construction front. And that's why —on almost every important defense project in the country—so many Cummins Dependable Diesels are on the job, day and night, seven days a week. . . . Because the "job-test evidence" has proved to leading contractors everywhere that there's no end to the Cummins Diesel's endurance . . . no limit to its ability to deliver full-rated power on a round-the-clock schedule in every heavy-duty service.

Assure uninterrupted operation on your job during the emergency by providing adequate maintenance and service for your Cummins Diesels. Take advantage of the complete parts and service facilities offered by authorized Cummins Dealers in all parts of the country. Cummins Engine Company, Columbus, Indiana.

ILLUSTRATED AT TOP: *A supercharged Cummins Dependable Diesel powers this Cletrac FDLC tractor with 23-yard Wooldridge Scraper.*

LEFT, ABOVE: *One of the fleet of Cummins Diesel-powered trucks owned by the S. T. Brotemarkle Construction Co.*

*War Regulations Leave the Quality Unchanged*

# RAZOR-BACK
## Shovels Still Give You 60% MORE BACKBONE

Extra thickness in the center, from tip to top, plus tapered sides, provides the strength and stiffness of a 13 gauge shovel with only 15 gauge over-all weight.

**PREFERRED BY PRIORITY BUYERS** for Perfect Balance, Deep Hang, Long Life, Easy Handle Replacement.

**THE UNION FORK & HOE COMPANY**
555 Hocking Street
Columbus, Ohio

Stone, Ballast and Industrial Forks, Asphalt and Road Rakes—Distributors Everywhere.

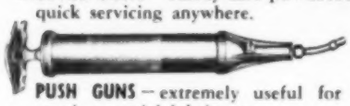
**SEND FOR FREE COPIES:** "How to Get More Work Out of a Shovel"—trains green hands, increases output without extra effort. Suitable for posting up on the job. Write us.

# Proper Maintenance
## IN YARD OR SHOP
requires specialized lubrication equipment for best results

**PORTABLE CHASSIS LUBRICATOR** with air-powered pump, adapters, control valve and six foot hose.

**PORTABLE TRUCK TYPE TRACK LUBRICATOR** with air-powered high pressure pump. Dispenses from original 100 lb. drum.

**LEVER GUNS**—handy and powerful for quick servicing anywhere.



**PUSH GUNS**—extremely useful for dispensing special lubricants.

★ ★ ★

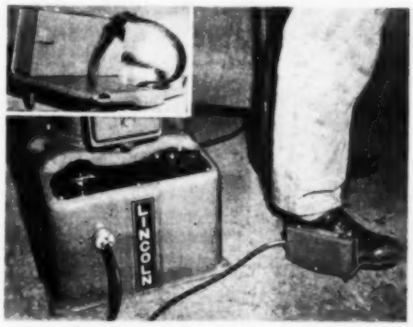
Other Graco models dispense gear, hypoid, oil and special lubricants. Graco equipment is available for war project contractors. Write for catalog #216, which illustrates and describes the complete line of famous Graco lubricators. Send for your copy TODAY

*Makers of* **GRACO CONVOY LUBERS**

GRACO

**GRAY COMPANY, INC.**
MINNEAPOLIS • MINNESOTA

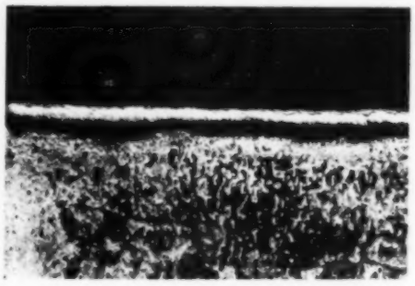
**LIGHTWEIGHT ARC-WELDING CONTROL** strapped to welder's foot enables him to move about freely, to speed up his work and to do a more accurate job. Specially intended for aircraft welding, but also applicable for welding of light-gage sheet metal of all kinds. With control strapped to his foot, welder




presses down on pedal which moves pin to operate current control. Permits accurate control over welding arc and achieves in one unit same results as both so-called "hot-start" and "crater eliminator." Because he has complete control, he can adjust the arc any time without changing his position. Control also eliminates necessity for making adjustments on welding machine, due to such things as minor changes in thickness and changes in fit-up and enables operator to weld in any position which he finds convenient and comfortable. Complete control of arc gives improvement in quality of weld, reducing danger of burning through or getting poor fusion or penetration. Available with 20 ft. of cable that can be plugged into socket on welding machine.—**Lincoln Electric Co., Cleveland, O.**

★ ★ ★

**PREVENTING ADHESION OF WELDING SPATTER** is job done by new liquid coating called "No-Spat" which is brushed over seam and area where weld spatter may fall. After welding, spatter may be wiped away, no chipping or grinding being necessary. No-Spat fuses with molten metal and maintains

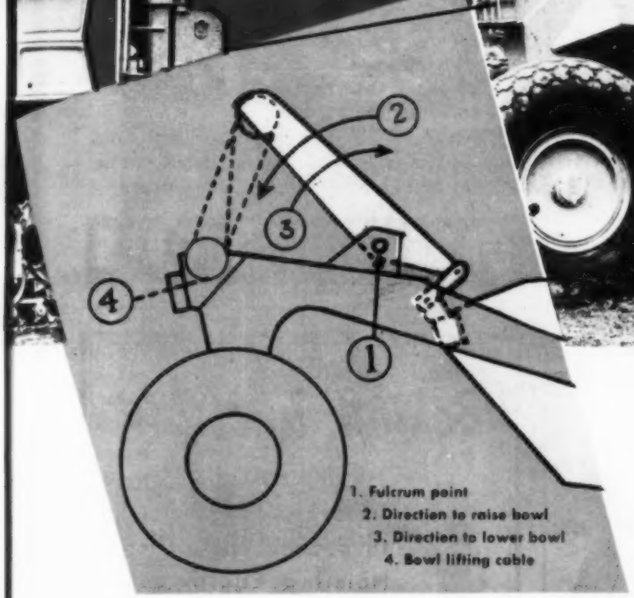


maximum tensile strength by floating off impurities and preventing porosity. Arc also is stabilized, minimizing rod spatter and saving rod metal. Said to be preferred by welders working in close quarters because of absence of obnoxious, gagging fumes. Manufacturer claims that it is an adequate rust protector, will not freeze and may be used over full welding range of amperage and voltage.—**The Midland Paint & Varnish Co., Cleveland, Ohio.**

★ ★ ★

**NEW BRAND OF LUBRICATING OILS** called Gulf Dieselube H. D. (heavy-duty) are made to meet specifications for internal combustion engines for ground equipment such as trucks, tanks and jeeps. Diesel engine tests conducted with these oils, according to claims, show them to be remarkable in engine cleanliness and lack of ring sticking. Also recommended for gasoline engines in commercial equipment

# Here's Why HEIL CABLE SCRAPERS Are FAST-LOADING ... Even in Loose Soils Like Sand




## JACK ARM ASSEMBLY

### GIVES FAST RAISING AND LOWERING OF BOWL

. . . with short cable length and low line pull. The jack-arm assembly uses the mechanical advantage gained by leverage to achieve this fast lifting action. The line pull is low because the lifting is done by leverage instead of directly through the cable.

*"Look at that pumping action!"* experienced scraper operators say, when they see the Heil Twin Cable Scoop operate for the first time. They refer to the rapid raising and lowering of the cutting bit made possible by the fulcrum-type lift — helping to force loose soils into the bowl, and saving many valuable minutes out of every operating hour . . . In improving scraper performance, Heil engineers developed fundamental design changes . . . such as scientifically located draft pivot point, tilting floor push-out, contoured bowl design, all-welded sections, etc. These improvements add up to bigger yardage at lower cost, so that you can earn a reputation for on-time performance . . . Investigate these features now and be prepared for post-war equipment purchases. Write for bulletins. R-9

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WISCONSIN

The HEIL Company is engaged in all-out war production for *Victory*

where service is extremely heavy to overcome ring sticking, lacquer formation and bearing corrosion. Oils contain blended ingredients which reinforce their resistance to heat encountered in tank motors and transmissions, provide additional film strength and offer increased protection to alloy bearings against corrosion. These oils also are said to reduce sticking of piston rings and sludge deposits to a minimum. — **Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa.**

★ ★ ★

# *Conservation Pledges* AS AID TO WAR EFFORT

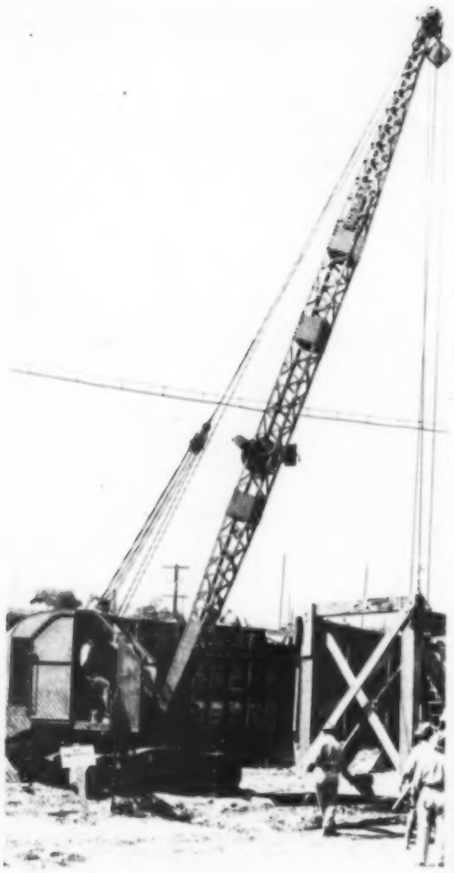
**EVERY CONTRACTOR OR OPERATOR** using construction equipment has been asked by The Thew Shovel Company of Lorain, O., to sign a pledge to conserve all the equipment in his possession in the interest of America's war effort. This is the first time that a manufacturer of this type of equipment has made such an unusual request.

The Lorain company is attaching the pledge cards to its advertisements, and to everyone signing a card it is sending a red, white and blue

**RED, WHITE AND BLUE EMBLEM** which is being sent by The Thew Shovel Company of Lorain, O., to every contractor and operator of industrial equipment who signs a card pledging he will do everything possible to prolong the life of the equipment.

emblem, as shown in the accompanying photograph, which the operator or contractor may display prominently on the equipment he is using. The company is also sending a book of instructions entitled "The Thew Lorain Emergency Fix-It Handbook" showing users how to make repairs

*(Continued on page 92)*

# Insley Helps *SPEED VICTORY*

Speed is an essential element in today's plans for victory . . . speed on the battle front . . . speed on the production-for-war front. When you remember that speed has for a quarter of a century been an outstanding feature of Insley excavators, it's easy, then, to understand why all Insley production is now earmarked for our armed forces . . . why Insley excavators are playing a vital role in helping to *speed the day of victory.* INSLEY MANUFACTURING COMPANY, Indianapolis, Indiana.

**INSLEY**

***Saves Time on Heavy Work***

The Carter R2 Portable Router packs a full 3 H.P. for heavy duty – and a speed of 15,000 R.P.M. – into a compact, truly *portable* unit weighing *only 35 pounds.*

Recessing big timbers for lap joints is typical of the many kinds of railroad, bridge, and dock work it handles easily. Boat builders, too, find the R2 one of their handiest tools, for rabbetting and other routing cuts.

Catalog No. 76 gives complete description. Write for a copy. **R. L. Carter Division,** The Stanley Works, New Britain, Connecticut.

**CARTER TIME-SAVING TOOLS**

# *Behind The Gun*

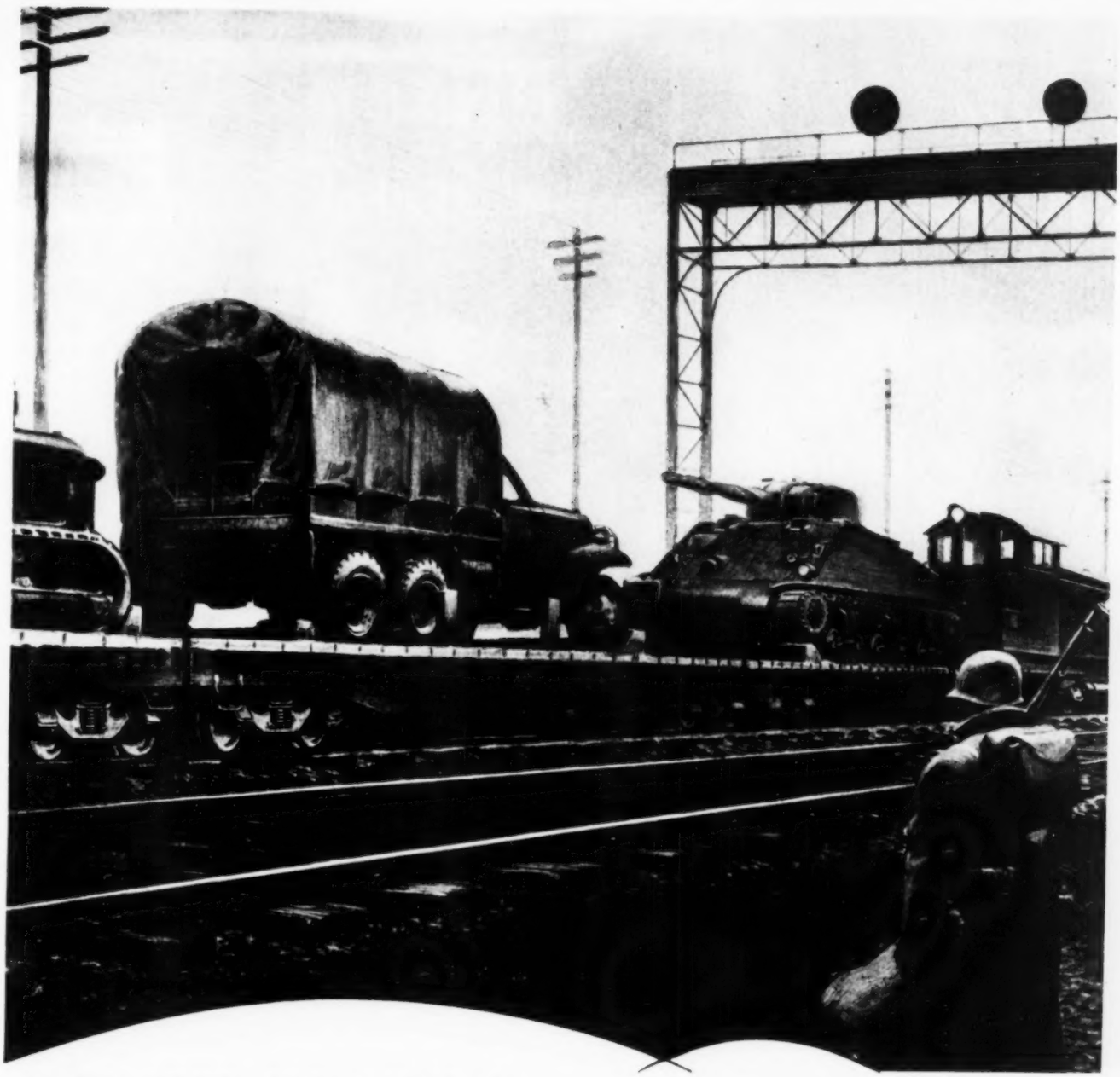
....and behind the machine, men have learned to depend on Coffing Hoisting Equipment. Rugged—dependable and economical. All Coffing ratchet lever hoists are tested up to 100% over rated capacity. Illustrated is model ATG "Safety Pull" ratchet lever hoist. Write today for Catalog GD6.

## COFFING HOIST CO.

*Manufacturers of*

RATCHET LEVER, SPUR GEARED, ELECTRIC AND DIFFERENTIAL HOISTS
TROLLEYS UTILITY MAINTENANCE TOOLS

DANVILLE, ILLINOIS



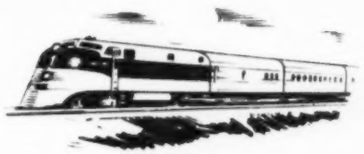
# WAR JOBS WELL DONE
# MEAN LOWER FUTURE POWER COST

SCARCELY anything you can name fills so many different war jobs as the General Motors Diesel engine. In tanks, landing boats, patrol boats, trucks, tractors and auxiliaries—everywhere sturdy dependability is needed—they're supplying power for our fighting forces.

The result is that, though plant facilities have mushroomed and production records are broken time and time again, everything we can make is hustled off to war.

But there is this important compensation. These accelerated war demands are advancing GM Diesel production and technique years faster than could the demands of ordinary peacetime manufacture.

So we can look forward to lower-cost power and to new peacetime applications for these engines when the war is won—to broadened fields where this power will serve.



*New eras of railroading follow in the footsteps of war. Another new era of railroading is assured in the wake of this war. General Motors Diesel locomotives already are establishing new standards of transportation.*

GM
DIESEL POWER

ENGINES . . . 15 to 250 H.P. . . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES . . 300 to 2000 H.P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

*Ace high-*
FOR HEAVY DAM CONSTRUCTION
THE AMERICAN REVOLVER

**AMERICAN REVOLVERS** have proved their perfect adaptability and superior speed, accuracy and ruggedness for all operations of large dam construction:

1—Placing forms, reinforcing steel, etc.

2—Pouring Concrete.

3—Stripping Forms.

Gantries can be adapted to all sorts of ground conditions to eliminate expensive trestle construction.

Low upkeep — High Re-sale Value.

Steam — Electric — Gasoline and Diesel Power.

SIXTY YEARS OF SAFETY 1883 1943
The Genuine CROSBY CLIP

AMERICAN HOIST & DERRICK CO.
SAINT PAUL, MINNESOTA
CHICAGO SAN FRANCISCO NEW YORK
AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.


*(Continued from page 90)*

without having to wait for new replacement parts.

In asking contractors and operators to sign the pledge the company advises them to "show others that you are helping to make your equipment last longer and work faster . . . it's one big way you will contribute to victory."

The pledge card or coupon reads as follows: "I hereby pledge that I shall do all in my power to prolong the life of any construction equipment in my ownership or care, regardless of type or make. I realize that it is my responsibility to avoid time-consuming delays caused by mechanical breakdowns and will see that frequent inspections are made and that necessary adjustments and repairs are promptly taken care of. I will avoid waste of parts and materials and will eliminate any abuse of my equipment due to non-recommended operation."

★ ★ ★

## A. G. C. Urges *Care in Use of Freight Cars* To Further War Effor

**THE ASSOCIATED GENERAL CONTRACTORS** is cooperating with the Interstate Commerce Commission in a campaign to keep railroad rolling stock in motion, H. E. Foreman, managing director of the Association, announced recently.

At the request of ICC Commissioner J. M. Johnson, the Associated General Contractors called upon its members to aid the war effort by prompt loading and unloading of rail equipment and by taking the best possible care of freight cars.

Contractors were requested to be especially careful in unloading both open top and closed cars. It was pointed out that hand holds, parts of air-brake mechanism and sill steps can be easily damaged when cars are moved by truck. Care was urged in the use of clamshells while unloading open top cars and in the use of sledge hammers and other tools to loosen wet or frozen commodities, or in opening up drop-bottom and hopper doors.

To facilitate greater possible use of rail equipment contractors were asked to take every possible precaution so that cars are not damaged and to see that they are properly cleaned and when released are in condition to be imme-

*(Continued on page 94)*

# MAKE THIS TEST — Prove BRIXMENT is BEST!

Mix a batch of 1-3 Brixment mortar (above) and a batch of 50-50 cement-lime mortar made with the same proportion of sand (right). Get any competent bricklayer to test them on the board—to spread them on the wall—to lay up a few brick with each of the two mortars. Then ask him *which* has the best workability.

# BRIXMENT *Assures*
# *More Economical Brickwork*

Aside from the cost of the brick itself, the most expensive item in masonry construction is the bricklayer's time.

Therefore the most economical mortar you can buy is the one that enables the bricklayer to lay the most brick per day. You cannot afford to give your bricklayer any mortar which causes unnecessary work, such as constant retempering, stooping to the board to replace mortar that failed to stick when he threw up the head-joint, etc.

To secure economical brickwork, the mortar must have excellent workability.

The plasticity of Brixment mortar is *ideal.* It approaches that of straight lime putty. It enables the bricklayer to do faster, neater brickwork, with the brick well bedded and the joints well filled.

This is the principal reason why Brixment reduces the cost of brickwork. But in addition, less labor and supervision are required in mixing. No soaking or slaking. No mortar is wasted. And Brixment mortar makes a neater job that costs less to clean down.

# BRIXMENT
## *For Mortar and Stucco*

*Louisville Cement Company, Incorporated, Louisville, Kentucky. Cement Manufacturers for Over a Century.*

FOR BIGGER PAY-LOAD DIGGING

HAISS

HI-POWER

CAST STEEL BLADE ARMS HOLD CLOSING ALIGNMENT...

Rigid strength and extra long bearings keep bowl closing true. Full efficiency. Bigger pay loads...They don't come any better.

Bucket Agencies throughout the country. Write or wire for prices, delivery, and catalogs.

GEORGE HAISS MFG. CO., INC., 139TH ST. & CANAL PL., NEW YORK

For SPEED and SAFETY...

LOWELL

Reversible Ratchet

WRENCHES

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a square contact. The pawl is in COMPRESSION ONLY — no shear, no tension, no torsion. The shipper carries NONE of the load. This strong construction insures steady service.

You gain speed through the easy handling, strong leverage and straight-line application of power on LOWELL REVERSIBLE RATCHET WRENCHES.

The improved new types of LOWELL WRENCHES are the result of more than 70 years experience and development — 1869 to 1942. They are made in a wide range of types and sizes for all classes of heavy construction, erection and maintenance.

Have patience with your dealer if he is unable to furnish all of the numerous LOWELL types and sizes, for we are engaged, for the duration, in supplying the needs of our Armed Forces.

LOWELL WRENCH CO.

1869 WORCESTER, MASS., U.S.A. 1943

*(Continued from page 92)*

diately placed at some other point for loading.

Commissioner Johnson urged the construction industry to load and unload cars as quickly as possible even if it entailed overtime, Sunday or holiday work.

★ ★ ★

## *Polarized Light* Shows Way to Strengthen Nuts and Bolts

**NUTS AND BOLTS IN STEAM TURBINES** and on other heavy duty jobs can be made 40 percent stronger by giving them broad shoulders and tapered bodies, members of the American Society of Mechanical Engineers were told recently by Dr. Miklos Hetenyi, of the Westinghouse Research Laboratories.

He explained, at the society's annual meeting in New York, that his new tapered design distributes stress more evenly on the threads of nuts and bolts. On conventional types the bottom thread carries most of the load.

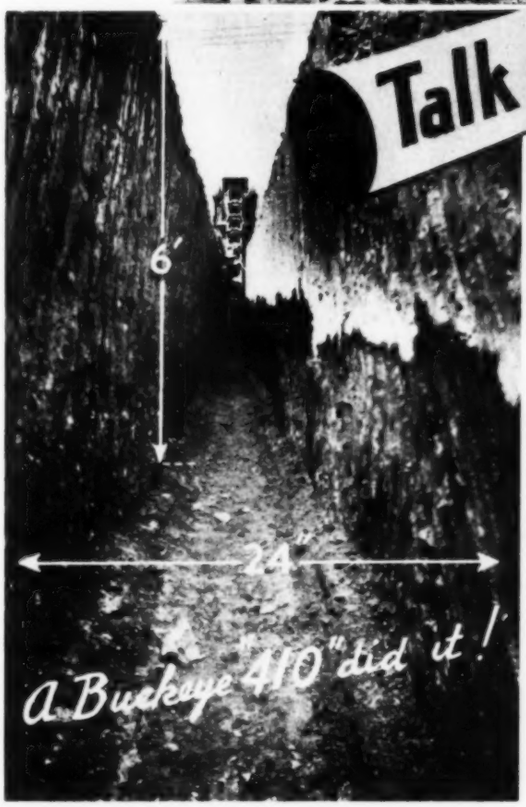
Dr. Hetenyi described how he used polarized light to see inside 5-in.-long plastic models that represented 5-ft., 500-pound turbine bolts that are sometimes subjected to million-pound pressures as the machine gets hot and expands. To simulate this strain 30-lb. weights were suspended from the bottom of each plastic model. The transparent plastic bolts were there for three hours at a temperature of 250 deg. F. to solidify the stresses produced by the weights.

After cooling, slices were cut ⅛ in. from the center of each model and placed in a polariscope. This instrument passed polarized light through the plastic sections and took pictures of the stress lines which had been baked in by heat. To the unaided eye the plastic was clear and transparent as before, but polarized light revealed rainbow-like lines which showed where strain was distributed in the models.

By studying polarized light pictures of variously designed nuts and bolts, Dr. Hetenyi found that a "broad-shouldered" nut, or a nut whose lower threads did not fit flush against a bolt, distributes its stresses at many different points. Ordinary nuts and bolts, on the other hand, concentrate their stresses at a few places while other parts carry no load.

# Talk About Saving Manpower!

With more machines like the fast, compact, "one-man" Buckeye "410" boom type trencher in use, Paul McNutt's War Manpower Commission won't have so many sleepless nights trying to figure how to fill three jobs with two men.




The "410" is the result of over 50 years of trencher engineering experience. Only 80″ high, 57″ wide (7′10″ including power-shifting conveyor). Handles like a truck, yet rugged enough to stand up under continuous cat-skinning. Single lever steering; both crawlers driven; wide range of cutting feeds—6″ to 38′ per minute; bucket line speeds 31′ to 189′ per minute; road speeds up to 2.67 miles per hour. Hydraulically controlled boom, forged bucket chain with patented splined bushings and reversible pins. Easy to transport. *Man, what a trencher!*

Comparatively new, yet dozens of them are in there pitching for Uncle Sam—digging clean, round bottom trench for drainage, sewer, water, gas and steam pipe and underground cable at airports, army camps, war plants, housing projects—at home and abroad—doing the work of a whole gang of men day after day!

**BUCKEYE TRACTION DITCHER CO.**
**Findlay, Ohio**

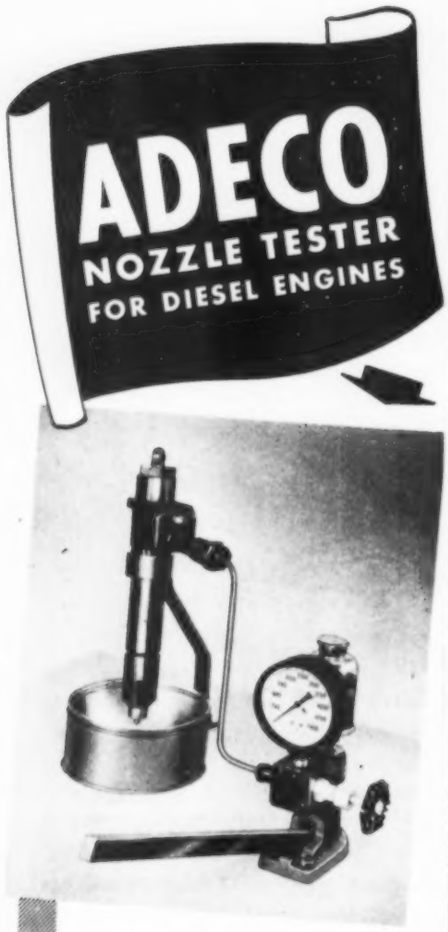
Wars demand scrap.
Invest in War Bonds.
No laying down on jobs.

See other Buckeye equipment on pages 29 & 36

50 YEARS OF PROGRESS BUCKEYE

# Buckeye

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS




# VITAL FOR MAINTENANCE

**PORTABLE . . . EASY TO USE . . . KEEPS DIESELS AT PEAK PERFORMANCE**

With this advanced-type, portable diesel nozzle tester, any mechanic can make quick, accurate tests of injector opening pressure, spray pattern, stuck needle valves and leakage around valve seats. Compact, light in weight and precision-built, the Adeco Tester checks all makes and sizes of injectors—on bench or engine—at pressures up to 10,000 p.s.i. Avoids costly delays and possible damage to injector tips. Keeps diesels operating at peak efficiency.

● **Write for new illustrated "Know-How" bulletin describing this Adeco unit—America's most widely used nozzle tester.**

**AIRCRAFT & DIESEL EQUIPMENT CORPORATION**
4401 NORTH RAVENSWOOD AVE.
CHICAGO, ILLINOIS


# Suggestions for Care of *Arc-Welding Machines*


Contributed by
THE LINCOLN ELECTRIC CO.,
Cleveland, Ohio


**LONGER LIFE** for arc-welding machines will be assured if the following suggestions are carried out in owners' maintenance departments.

## General Instructions

(1) Blow out welder and controls with air hose at least once every two months —once every week in dusty locations.

(2) Current control contacts on SAE welders are self-lubricating and should not be greased. Keep contacts clean.

(3) Starting switch on electrically driven machines should be inspected every six months. Any accumulated dirt or dust should be brushed or blown off the insulating parts.

(4) Keep electrode and ground connections tight.

## Bearings

Each welder is equipped with ball bearings having sufficient grease to last one year under the most severe service. The following instructions should be noted to get the maximum number of years of service from the bearings:

(1) *Lubrication*: An ounce of grease each year is sufficient for each bearing. A pad of grease 1 in. long, 1 in. high and 1 in. wide weighs approximately 1 oz. Also, the grease cup when used holds approximately ½ oz.

(2) *Cleanliness*: Dirt is responsible for more ball-bearing failures than any other cause. This dirt may get into the grease cup when it is removed to refill, or it may get into the grease in its original container. Before removing the grease cup or pipe plug, it is important that it be wiped absolutely clean. A piece of dirt no larger than the period at the end of this sentence may cause a bearing to fail in a short time. Even small particles of grit that float around in factory atmosphere are dangerous if in sufficient quantity.

(3) *Lubricant*: Ordinary cup grease is

*(Continued on page 98)*


## Here Is Your Nearest Worthington Distributor

**For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools. Get your EQUIPMENT-SAVER — FREE**
**see full page ad page 97**

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ARIZONA
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ARKANSAS—Fort Smith — R. A. Young & Son
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CALIFORNIA
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Middleton — S. T. Randall, Inc.
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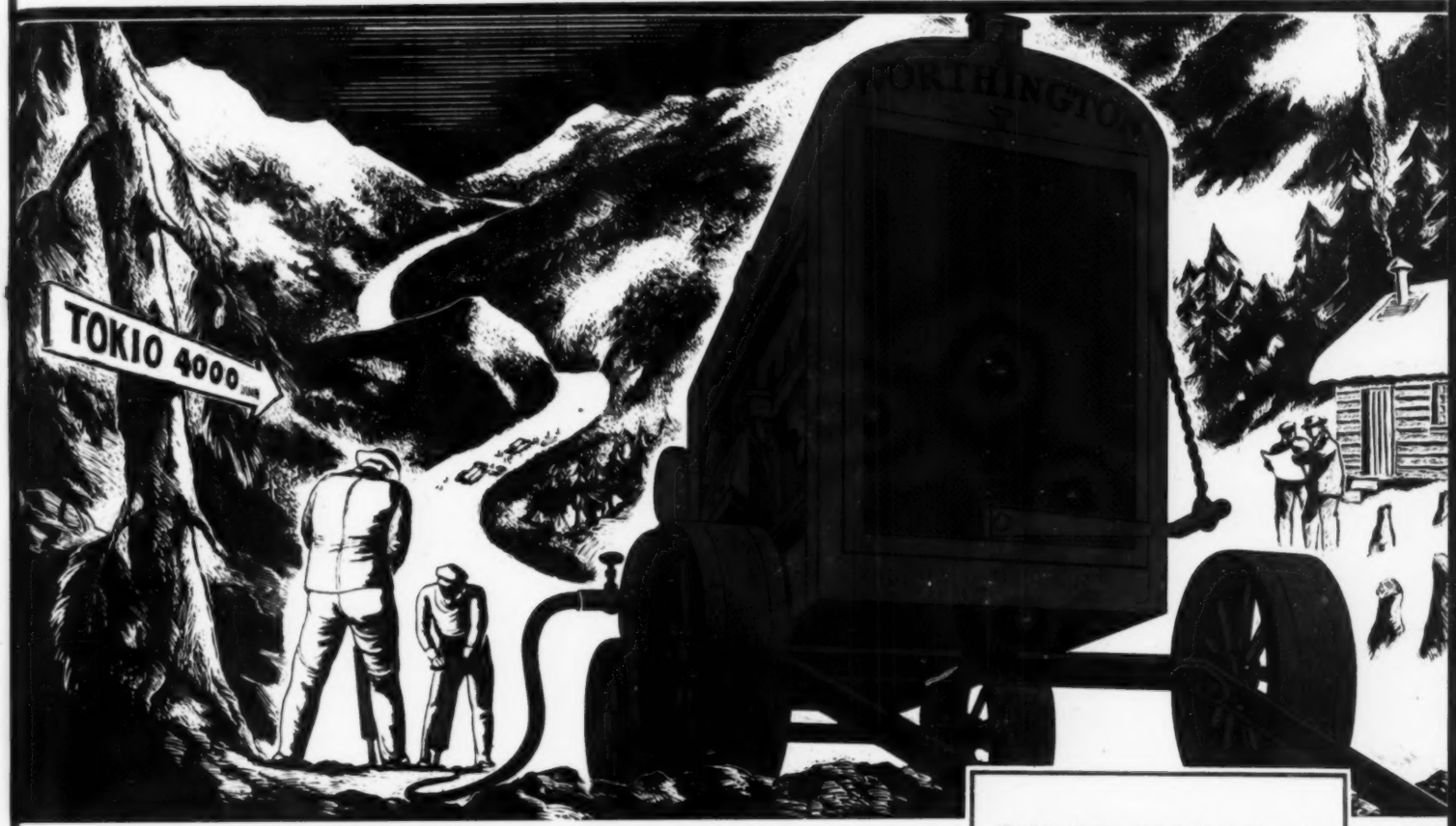
**Get more WORTH from air with WORTHINGTON**

*Buy Blue Brutes*

**Worthington Pump and Machinery Corp.**

# AIR-POWER NORTH TO TOKIO...




Ask them along the road to Fairbanks what Blue Brutes can do. The builders wanted rock-blasting air-power they could count on for the toughest construction job since Panama. They took Worthington Blue Brute Compressors and Air Tools — in "uniforms" of olive drab.‡

Over 1200 miles of boggy marshland, swamp-traps, axle-busting mountain peaks, through mud and ice, they helped blast the Alcan highway through. Alaska's, Tokio's fate hangs by that road-thread. Blue Brutes stood action's test.

Worthington Blue Brute Compressors . . . portable and semi-portable . . . gasoline, diesel and electric driven . . . have staying power in a pinch because like road-trained champion heavy-weights they're gentle-breathing. The improved Feather* Valve stops gulping "back talk", when lesser breeds whine for the tool shed. *They deliver more air,* steadily, per power-dollar.

Smooth, easy-handling strength makes Worthington Rock Drills and Air Tools also your best "brutes" for fast, historic construction. Sturdy, quality-strong, *they use less air.* Your test will prove it.

‡Blue Brute Compressors and Air Tools are painted olive drab for the Army. *Reg. U. S. Pat. Off.

**Behind the Fighting Fronts with**

## BLUE BRUTES

A famous West Coast shipbuilder, who recently broke all records building Liberty Ships, buys Blue Brutes to provide air-power for a multitude of operations, 24 hours a day. Blue Brutes are performing like this in hundreds of Army camps, Navy yards, air bases and ordnance plants throughout the country. Your nearest distributor is listed on page 96.

## *Get more* WORTH *from air with* WORTHINGTON

# BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

**WORTHINGTON**

Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts

## WHAT YOU CAN DO TO HELP THE WAR EFFORT!

Take good care of everything you own. This means literally everything . . . your business equipment, home appliances, automobile, clothing, furniture, kitchen utensils and other items too numerous to mention. The less replacement of civilian necessities of life is required, the more of the national effort can be devoted to war.

Make every effort to keep in good health. Illness not only keeps you away from the job but may add to the already heavy burden of the doctors still in civilian practice and the hospitals that are operating under difficulties.

Be as economical as possible in the use of food, fuel and all kinds of household supplies. Even those products of which there are ample supplies in this country must be transported and all transport facilities are heavily burdened.

Before making a telephone call, ask yourself if it is really necessary. The telephone lines are congested with war business and material is not available to permit expansion of communication systems.

Reduce traveling as much as possible. It is hardly necessary to stress the importance of curtailed automobile travel. As for rail travel, the railroads are handling a tremendous and mounting load. No new passenger equipment is being built. Existing cars and locomotives must handle the traffic.

Comb your property for scrap iron and steel, rubber, copper and rags; turn these things in though local salvage channels.

Take extra good care of your construction equipment. Instruct your operator or maintenance man to give periodic check-ups to replace dangerously worn parts; lubricate thoroughly at the required intervals; keep all wearing parts adjusted for efficient performance; paint when necessary to prevent rust and take precautions to protect radiators and pipes from freezing.

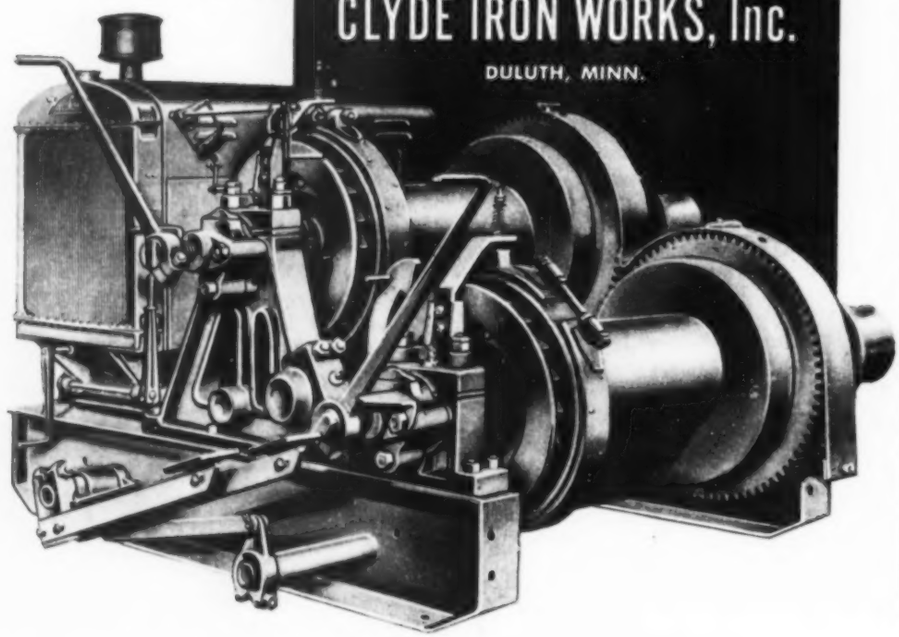
ARMY E NAVY

*For Outstanding Achievement*

CLYDE

CLYDE IRON WORKS, Inc.

DULUTH, MINN.




*(Continued from page 96)*

not satisfactory for proper lubrication of ball bearings. The following precautions should be taken in the selection of grease:

(1) Do not buy bulk grease unless proper dispensing container is available.

(2) Buy only those greases which come in factory sealed containers if small quantities are desired.

(3) Keep grease clean, use only clean instruments to transfer grease from can to bearing. Do not wipe any parts with a dirty rag. The best grease if dirty is worse than a poor grease which is clean.

(4) Avoid a grease which is so thin it may run through the grease seal. Grease should be no thinner than apple butter.

(5) Avoid channeling greases.

(6) Do not use any grease which contains mica or graphite. (Such greases usually so specify on label.)

(7) Smell the grease. If it has a rancid odor, do not use.

(8) Dig into the grease with a clean stick or clean screw driver. If color is not the same throughout or if any oil has separated, do not use.

(9) Turn the can upside down. If any oil runs out, do not use.

(10) Place a spoon full of grease in a can lid. Heat slowly (avoid sizzling or crackling of grease) till it is melted, then cool.

DO NOT USE IF:

(1) Grease is definitely either harder or softer than before heating.

(2) Layer of oil remains on surface.

(3) A layer hardens so that it may be broken like thin ice.

(4) *Inspection*: The bearings in this welder are thoroughly sealed from dirt. Providing no dirt is allowed to get in with the grease when the bearing is lubricated, no grit or dirt can get into the bearing. Therefore, it is unnecessary and inadvisable to inspect the bearings at any time.

### Commutator and Brushes

The brushes on the generator and exciter are properly adjusted when the outfit arrives. No particular attention is required to keep them in good condition. They should be replaced before the pigtails are within $\frac{1}{8}$ in. of the commutator or before the limit of spring travel is reached. Replace with the same kind originally furnished. Send them in

*(Continued on page 100)*

*Play safe with*

# GULF Dieselube H.D.

*. . . the new detergent type lubricating oil for heavy-duty service*

**High detergent action and lubricating value of Gulf Dieselube H.D. insure minimum ring sticking, minimum engine deposits and maximum protection against wear.**

Years of exhaustive research by Gulf technologists have produced an improved lubricating oil of the detergent type—Gulf Dieselube H.D. (heavy duty).

Gulf Dieselube H.D. meets U. S. Army specification 2-104A for use in automotive gasoline and Diesel engines and has been approved by manufacturers of Diesel engines for tractors and trucks. Leading builders of armored tanks are using this quality oil for lubrication of engines and transmissions.

Severe heavy-duty Diesel engine tests show Dieselube H.D. keeps engines remarkably clean and gives maximum freedom from ring sticking.

This new oil is recommended for use in bus, truck, tractor, marine, and industrial Diesel installations, as well as for other Diesel engines where manufacturers recommend or operators desire a detergent type oil of the highest quality which is noncorrosive to alloy bearings.

Gulf Dieselube H.D. is also recommended for gasoline engines in commercial equipment where service encountered is extremely heavy and where ring sticking or lacquer formation has been encountered with previous oils.

For further information on Gulf Dieselube H.D., send the coupon below.

GULF *Mail this coupon today*

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LUFKIN
TAPE-RULES

"WIZARD"

Here's that handy vest-pocket rule you've seen so many busy men carry. Can be projected, unsupported, like a rule or flexed, like a tape, around corners, etc. Operates smoothly. Blade is manually withdrawn and returned to case. ½" blade. 72" to 120".

"MEZURALL"

The most practical and compact all-purpose tape-rule. For measuring inside as well as outside dimensions. Weighs only three ounces. Dark, prominent markings make it easy to read. ½" blade manually operated. 72" or 98". Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR

LUFKIN
SAGINAW, MICHIGAN • New York City
TAPES • RULES • PRECISION TOOLS

*(Continued from page 98)*

according to instructions in the instruction manual. One complete set should always be kept on hand. New ones must be sanded in before they can be used on the machine. This is accomplished by removing the old brush from the holder, placing the new one in position with a piece of medium sandpaper placed under it. A second person should hold it in its normal position by a slight pressure of the fingers. The sandpaper then should be drawn back and forth under it with the back of the sandpaper held closely in contact with the commutator. This will wear the brush down to the curve of the commutator. When the end has the proper curve, the operation is complete. Care should be exercised to blow all of the carbon dust away from the commutator.

The commutators require practically no attention. They should be cleaned from time to time with a clean rag, or with a piece of fine sandpaper while running. Never use emery cloth or paper for this purpose. It is desirable to check the brush springs occasionally to make sure they are holding the brushes on the commutator with a firm, even pressure.

★ ★ ★

## USE OF *Flight Strips* PREVENTS AIR ACCIDENTS

**FLIGHT STRIPS** which have been constructed as auxiliary landing fields along public highways already have prevented a number of airplane crashes and have saved several lives, the War Department announces.

The life of a soldier at one northern post was saved when two Army doctors were flown in at night to perform an emergency operation. Because of a snowstorm, the regular airfield could not be used. Army trucks were lined up to illuminate the flight strip with their headlights so that the mercy plane could land and take off.

In the East, a heavy bomber which was unable to locate a large airport during sub-zero weather, landed on a 7,000-ft. concrete strip.

Civilian engineers and state highway officials who cooperated with the War Department were highly commended by Colonel Stedman S. Hanks, Air Corps, for their part in the construction of these flight strips.

CMC
A GREAT WARTIME RECORD

On the front lines of war-time construction all over the world, CMC equipment has been getting the jobs done. Yes, CMC Mixers, Pumps, Hoists, saws, Carts and Barrows have joined the Army, Navy and Marines, and will be remembered for their ability to STAND UP AND TAKE IT under the punishing service of the greatest construction program in the history of mankind.

CONSTRUCTION MACHINERY COMPANY
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MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIP.
SAWS • CARTS • BARROWS

FOR MATERIAL AID in MATERIALS HANDLING
*It's* ROBINS

The handling of materials represents a large part of your operations. Buy equipment able to handle the most TPH – with greatest effectiveness, least maintenance and longest life. For material aid in materials handling . . . it's ROBINS.

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111M ELIPTEX SCREEN. For coarse sizing.
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120M IDLERS. ROBINS originated the troughing idler . . . and produces a complete line of highest quality.

Engineers • Manufacturers • Erectors of Materials Handling Machinery

ROBINS CONVEYING BELT CO.
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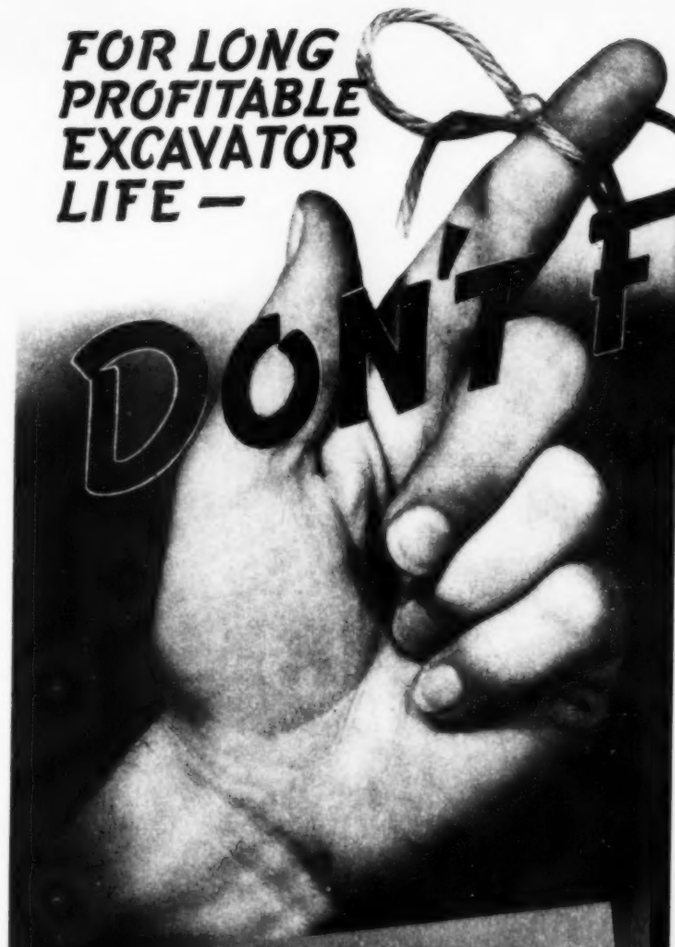
# FOR LONG PROFITABLE EXCAVATOR LIFE — DON'T FORGET



**CHECK ENGINE LUBRICATING OIL TWICE EACH SHIFT**

Oil should be checked after machine is stopped and oil has drained back into oil pan. Add oil if necessary. Oil filters should be drained and filters serviced at intervals prescribed by engine builders. (Engines without filters should be drained every 50 hours). Oil screen in crank case of engine should be examined every month and cleaned if necessary.

**CHECK OIL IN GEAR CASES EACH WEEK**

Oil should be changed when it shows signs of thinning and the body of the oil starts to break down. Do not permit oil to get too low that the gears will not pick up and distribute it. Keep vents in filler cap open to avoid the case leaking.

**LUBRICATE CRAWLERS AFTER EACH SHIFT**

Grease crawler tread rollers every eight hours regardless of distance traveled or every half mile if they are in continuous operation. Keep crawler treads properly adjusted—never work machine with a loose crawler belt.

**SEE THAT OIL OR GREASE REACHES EVERY PART THAT REQUIRES LUBRICATION**

When a shaft, gear or clutch is in such position that greasing or oiling is impossible, operator should take time to turn machinery over so that every part may be properly lubricated. Oil lines to inner bearings should be inspected often, as vibrations sometimes loosen line connections. Regardless of how big a hurry you are to start the machine, remember, the oiler on the shift before you may not have taken time to oil or grease places not easily accessible.

*Be sure to use proper type and grade of lubricants*

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division - - - - - - LIMA, OHIO

NEW YORK, N.Y. · SAN FRANCISCO, CALIF. · SEATTLE, WASH. · PHILADELPHIA, PA. · DALLAS, TEXAS · SPOKANE, WASH. · MONTREAL, Quebec, Can. · NEWARK, N.J. · PORTLAND, ORE. · MINNEAPOLIS, MINN. · MEMPHIS, TENN. · LOS ANGELES, CALIF. · ST. LOUIS, MO.

ARMY-NAVY E AWARD FOR WORK WELL DONE

Buy War Bonds and Stamps

# LIMA

SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

# MERCER
## WHEEL-TRACTOR CRANES
### Ask the Men Who Handle 'Em!



*"We're pals — me and my Mercer Crane! Just show us the work... we'll clean it up in jig time. My No. 7's a real sweetheart — it's just about the smoothest tonnage tackler on wheels!"*

Live Boom, Telescoping Gooseneck Boom Head with Boom Rollers.

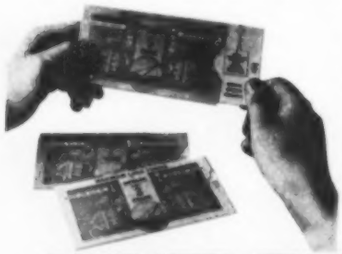
Standard Live Boom equipped with double sheaves for main and topping hoist lines.

*"Mercer—that's MY Crane! It picks 'em up and puts 'em down just like it was no effort at all! You'll go a long way, Buddy, before you'll find a Mercer Crane that can't take it!"*

A Single Hoisting Line that goes over the top—designed especially for Stevedores.

## 3, 5 and 7 Ton Capacities!

**Compact, fast, sturdy... they deliver hard, continuous service at low cost. Gasoline-powered . . . one-man operation. Single or double-drum hoists. Cushion rubber or pneumatic tires. Special booms and heads for every type of lifting, carrying and loading. Parts standardization means simple adjustment and servicing in the field. Our new Catalog No. 65 completely illustrates and describes the entire line. Write for your copy today.**



**To assist Mercer Crane Operators and help conserve equipment, we offer a group of "Maximum Load Finders" covering all models. These jumper-pocket size "rules", shown at the left, tell the operator at a glance exactly the maximum load he can safely carry at various distances in front of the bumper plate. These handy gadgets are yours for the asking!**

**"THE NAME THAT CARRIES WEIGHT"**

## MERCER ENGINEERING WORKS, INC.

*Materials Handling Equipment*

30 CHURCH STREET, NEW YORK, N. Y.

WORKS: Clifton (Allwood), N. J.


# NEWS FROM MANUFACTURERS *About Their Products*

*The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.*

MATERIALS HANDLING MACHINERY — **Robins Conveying Belt Co.,** Passaic, N. J. (24 pp., illustrated, two color.) Describes and illustrates various installations of handling machinery for coal, ore and other bulk materials as designed and built by Robins-Mead Morrison, recently merged. Subjects treated: Rope system and man trolley bridges; towers of various types; special coal and steel handling rigs; grab buckets; car dumpers; car and barge haulage systems; rail clamps; cable railways. Final page lists Robins products.

★ ★ ★

ASPHALT PENETRATION SURFACE—**The Asphalt Institute,** 801 Second Ave., New York, N. Y. (12 pp.) Specification MP-2 for Modified Penetration Cut-Back Asphalt Surface Course gives requirements for aggregates and asphaltic materials and prescribes methods of construction.

★ ★ ★

AUTOMOTIVE MAINTENANCE CLEANING HANDBOOK — **Oakite Products, Inc.,** 24G Thames St., New York City. (36 pp., illustrated) Covers all essential phases of cleaning required in repair, overhaul, and general maintenance of trucks, tractors and other automotive equipment. Handbook describes in detail improved, time-saving methods for (1) degreasing iron, steel, aluminum motor parts with hot or cold solutions; (2) reconditioning clogged radiators and cooling systems of both gasoline and diesel engines; (3) cleaning motors, chassis and running gear by steam-detergent and pressure-spray methods; (4) keeping garage repair shop floors and work pits in clean, grease-free condition to help save tires and make them last longer. All above subjects are fully described and well illustrated. Free copies available on request.

★ ★ ★

ALL-PLASTIC RESPIRATOR—**Mine Safety Appliances Co.,** Braddock, Thomas & Meade Sts., Pittsburgh, Pa. Bulletin CM-6 describes and illustrates compact, lightweight device known as Clear-Vue Model Dustfoe and made of transparent plastic, said to be durable, odorless, non-corrosive, and non-conductor of electricity and heat. Filter may be inspected for proper insertion and seal without removal from respirator, plastic catch on filter case locking positively in place only when filters are in correct position. Unit is comfortable to wear and gives approved protection against all pneumoconiosis-producing, nuisance or toxic dusts. Self-adjusting face piece has new form-molded sponge rubber face cushion and an army-type exhalation valve for drainage of condensation. Requires little maintenance and may be completely disassembled without tools in few seconds.

# SPEED

**TO KEEP YOUR GRADERS ROLLING FOR VICTORY...**

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition —check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

*If you need help or advice on any of the above, see your local Adams distributor.*

★★★ Just as SPEED allows PT boats to roar in, do their jobs and get away quickly so their high transport speeds and wide range of working speeds enable Adams Motor Graders to get to a job quickly, finish it in a hurry, and get on to the next with minimum loss of valuable working time . . . SPEED is but one of the features of Adams Motor Graders that will help you to complete your jobs quickly, economically and profitably!

**J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA**

*Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.*

**Adams**

**ROAD-BUILDING AND EARTH-MOVING EQUIPMENT**

# ★ BRANDS AND BONDS ★

On the far flung land fronts of this world conflict you will find various brands of the "Ames" line of shovels playing an important part. "Ames" shovels are even more essential in war than in peace. On the home front . . . War Bonds are the power that winds the mainspring of our war machine . . . for they provide the tools of war and victory. Buy War Bonds for Victory and save for Peace. "Ames" Brands and War Bonds . . . both a necessary investment!

COLT • PONY • HUSKY • O. AMES • OPTIMUS • PEERLESS • FAVORITE • TWO STAR

AMES Since 1774

RAM • CARTER • BRONCO • KNOXALL • RED EDGE • PINNACLE • THREE STAR • MONONGAH

PARKERSBURG, W. VA. ★ AMES BALDWIN WYOMING CO. ★ NORTH EASTON, MASS.



# Wheel 'em HARD! Wheel 'em OFTEN! Sterlings can TAKE IT

In the present emergency . . . with new wheelbarrows practically unobtainable . . . Sterlings are proving again and again that they can take hard, everyday punishment and come back for more. Engineered and built for the tough jobs, Sterlings have supplied dependable material transport service for almost 40 years. In wartime or in peacetime production, you can rely on Sterlings to carry the loads.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

ASPHALT PAVING REVISIONS—**The Asphalt Institute,** 801 Second Ave., New York, N. Y. (4 pp.) Pamphlet entitled "Construction Series No. 67—Emergency Revisions of The Asphalt Institute Construction Specifications" lists changes made necessary by government war order limiting number of asphalt grades.

★ ★ ★

STRUCTURAL WATERPROOFING COMPOUNDS—**Sika, Inc.,** Passaic, N. J. (4 pp., illustrated.) Describes and illustrates various uses of (1) Sika waterproofing compounds for use in concrete and brick mortar to impart maximum impermeability; (2) quick-setting compounds for use on all types of concrete structures and mortars where leaks have developed; (3) waterproofing and repairing compound for air-gun application to facilitate covering of large surfaces; (4) grout Sika for pressure grouting in tunnels and foundations of dams, power houses and other heavy structures; (5) expansion joint compounds; (6) miscellaneous products for use in dampproofing external surfaces, for surface hardening and for tile setting.

★ ★ ★

LUBRICATION GUIDE—**R. G. LeTourneau, Inc.,** Peoria, Ill. (Illustrated 16x20-in. chart.) Quick reference lubrication chart on complete line of this company's equipment including power control units, carryall scrapers, dozers, rooters, cranes, sheepsfoot rollers, Tournatrailers and Tounapulls. Graphically tells and shows what points are to be lubricated at what intervals and recommends proper lubricants and grease to be used for most efficient operation. All main lubrication points are plainly numbered and keyed to equipment illustrations. Lubricating time recommendations conform with those for tractor lubrication, wherever possible, to minimize shutdown time for greasing equipment. Packed with hints on proper grease and oil specifications. Explains how to lubricate through hydraulic grease fittings, buttonhead fittings and by hand-packing.

★ ★ ★

CARE OF BALL AND ROLLER BEARINGS—**Lubriplate Div., Fiske Brothers Refining Co.,** 129 Lockwood St., Newark, N. J. (4-p. bulletin.) Sets forth valuable instruction on installation, care and lubrication of ball and roller bearings for use of operating and maintenance engineers interested in obtaining best possible performance and long life of anti-friction bearings.

★ ★ ★

TESTING STRUCTURES, EQUIPMENT AND MATERIALS—**Waugh Laboratories, Waugh Equipment Co.,** 420 Lexington Ave., New York City. (Loose-leaf tabbed binder in color.) Comprehensive listing, with descriptions and illustrations of this laboratory's services, instruments and facilities for testing structures, equipment and materials. Pictorial presentation of types most frequently requiring tests for stresses, strains, vibrations, acceleration or sound. Strains, for example, in airplane parts, railroad rails or concrete structures due to forces can be accurately measured. Ships can be given their "shake-down cruises" before they ever put to sea. Sound can be seen. Useful life of bridge members can be prophesied accurately and any weakening of parts detected. Ability of structures to withstand earthquake shocks and protection afforded by bomb shelters can be predetermined. Second section of book makes available to those interested description and illustration of complete line of test instruments and machines for determination and analysis of stresses and for testing of materials. Instruments and machines may be purchased outright or rented from laboratories. Engineering field service and laboratory facilities also are furnished, if desired.

# *You Bet-I'm Busy!*

## but not too busy to keep my equipment in A-1 shape!

**With new machines and replacement parts hard to get, it's practical patriotism, as well as good business, to adopt a regular schedule of inspection, lubrication and maintenance of your present equipment . . . . . Keep your MICHIGAN Mobile CRANES in shape to carry on under war-time pressure.**

## CHECK THESE VITAL POINTS REGULARLY:

- √ **Power Take-Off:** Inspect housing weekly for proper oil level. Use SAE No. 250 in summer; SAE No. 140 in winter.
- √ **Hoist, Crowd, Intermediate and Swing Shafts:** Remove and repack bearing retainers every six months. When machine is worked longer than normal hours, repack retainers more frequently.
- √ **Boom Point Sheave Bushings:** Grease daily through high-pressure fittings. Inspect sheave flanges for wear. Sheaves in good condition will contribute to longer cable life.
- √ **Cables:** Inspect regularly for wear. Apply lubricant by brush as required.
- √ **Main Drive Chain:** To eliminate chain slap, add shims under hoist shaft support brackets.
- √ **Clutches (Hoist, Crowd, Swing):** To adjust, remove cotter keys and tighten the three nuts located on extreme diameters of clutches to an even, snug pressure. Back nuts off five notches and replace cotter keys.

**Our engineering staff is ready to offer its services in helping you solve your lubrication and maintenance problems. Write today . . . Ask for Bulletin CM43.**

★ ★ ★ ★ ★ ★

Model T6-K Michigan Mobile Shovel-Crane, ⅜ yard capacity. Convertible to standard front-end attachments.

AIR CONTROLLED

# MICHIGAN

## POWER SHOVEL CO.

**BENTON HARBOR, MICHIGAN**

• HELPFUL
• AUTHORITATIVE
• COMPLETE

READY FOR YOU NOW!

FREE-NO OBLIGATION

This carefully-prepared Conservation Handbook is offered as a working tool to industry by M.S.A., world's largest commercial manufacturer of approved safety equipment. You'll find the detailed suggestions for extending the life of your present safety equipment to be of sound, practical value—for purchasing, operating and maintenance men alike. The Handbook is available for wide distribution, without cost, as a further M.S.A. service in these times.

Write

FOR THE NUMBER OF COPIES YOU NEED—FOR YOUR KEY MEN WHO ARE RESPONSIBLE FOR MAINTENANCE OF SAFETY EQUIPMENT.

36 PAGES OF USABLE FACTS ON HOW TO GET THE MOST—FOR THE LONGEST TIME—OUT OF YOUR INVESTMENT IN ESSENTIAL SAFETY EQUIPMENT!

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STS. · PITTSBURGH, PA.


HARD FACING ALLOYS FOR EQUIPMENT REPAIR—**Stoody Co.**, 1134 West Slauson Ave., Whittier, Calif. (14 pp., illustrated) Booklet "Pointers" gives practical advice on how to use hard-facing alloys to repair or rebuild worn parts of construction equipment. Information is presented in condensed tabular form, with explanatory drawings, with columns covering part to be repaired —such as tractor grouser, shovel teeth, bucket, crusher jaws—type and amount of hard-facing welding rod required, welding time, benefits derived from hard-facing and details of welding procedure. The clear and concise arrangement of the information make it useful to any one responsible for the upkeep, maintenance and repair of construction equipment.

★ ★ ★

CONCRETE PAVEMENT DESIGN—**Iowa Engineering Station,** Ames, Iowa. (96 pp., illustrated) Bulletin 157, "Stresses in the Corner Region of Concrete Pavements," by M. G. Spangler, research associate professor of civil engineering, Iowa State College, offers a relatively simple working formula, believed adequate for design use, by which stresses in corner regions of concrete pavement slabs may be calculated. Bulletin presents brief discussion of other research studies on concrete pavement stresses and describes steps leading to development of working formula for corner load stresses. An analysis is made of observed corner breakage on two sections of concrete pavement in service, and thickness of pavement which would have been required to prevent excessive corner breakage is calculated.

★ ★ ★

METALLIZING APPLICATIONS—**Metallizing Co. of America,** 1330 W. Congress St., Chicago, Ill. (18 pp., illustrated) Booklet describes and illustrates methods used for many repair and maintenance jobs which have been accomplished by building up worn parts with molten metal sprayed by small metallizing gun. Applications shown include repairs to worn shafts, shaft bearings, pump rods, cylinder liners, cylinder heads, crankshafts, engine parts, pump castings and many other worn metal units. Equipment employed for metallizing is completely described.

★ ★ ★

## Horizontal Radial Well Dewaters Ground for Driving of Shield Tunnels

*(Continued from page 64)*

cover over the tubes. Rather than use any method of partially dewatering the ground, the George H. Flinn Corp. with the approval of the engineers elected to install a horizontal radial

*(Continued on page 108)*

# ROEBLING "Blue Center" is in there with them!

Trained and equipped to work *and* fight, our U. S. Navy Construction Battalion—"Sea Bees"—are erecting needed bases and facilities in the South Pacific today as fast as the terrain can be reasonably cleared of Japs. As often as not, before turning to jobs like the generator installation above, these versatile recruits from America's construction industry lend a hand with the "terrain clearing" themselves . . .

Wherever these work-wise veterans are working—hacking an airport out of New Guinea jungle, installing a generator to furnish light and power for beach installations in the Solomons, building roads and barracks and bases the world around—they use wire rope they know they can depend on to work and fight right along with them. Rope that has the right qualifications—type, size, construction—for the job on hand.

That's why you'll find Roebling "Blue Center" Steel Wire Rope on the job today where you find tough going like this. For with the know-how gained in more than 100 years of wire-rope engineering, Roebling men build into "Blue Center" the extra value that helps it meet the most difficult conditions unflinchingly. As battle-wise and work-wise as the "Sea Bees" themselves, "Blue Center" Rope is giving a fighting account of itself in thousands of installations—on cranes and bull-dozers and shovels, on ships and hoists and drilling lines.

**ROEBLING**
***"Blue Center"***
**STEEL WIRE ROPE**
*PREFORMED OR NON-PREFORMED*

## ARE YOUR ROPES WORKING . . . OR FIGHTING TO WORK?

You can help your ropes work better, longer by relieving them of the necessity of *fighting* against worn sheaves, lack of proper lubrication, incorrect installation procedure . . . To help you do just that, Roebling has assembled a store of conservation data—summarized it on a handy 4 x 5 inch tag that you can put right onto your equipment. It's a simple, direct way of keeping your operating men constantly posted on the correct way of handling and using wire rope on the job. Copies of this tag are yours for the asking. Our nearest office will furnish you with as many as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY *Branches and Warehouses in Principal Cities*

# A pound of REPAIR ★ ★ ★ is worth a ton of REPLACEMENT

## Equipment kept in repair has double WAR Value

1. It stays longer on the job, keeps out of the repair shop.
2. Constant repairs postpone equipment replacements and conserve valuable war materials.

That's the whole story in a few words. Surely no hard-headed and patriotic equipment user needs to be SOLD on the urgent need for "doing the most with what we have." If you're using Reliance Products and repairs DO become necessary, you'll find their rugged simplicity a big asset in such work. There's nothing complicated or hard-to-fix about Reliance Equipment. The same construction that makes them stand up on the job makes them easier to fix. Don't wait for breakdowns. Go over your equipment NOW and you'll be well repaid for your time and trouble.

**UNIVERSAL ROAD MACHINERY CO.**
KINGSTON, N. Y., U. S. A.

Distributors in ALL principal cities of the U. S. A.

**•Want advice? write RELIANCE**

*If you're using Reliance products, tell us which ones and we'll be glad to advise you how to stop trouble before it starts. This service creates no obligation on your part. Write us today.*

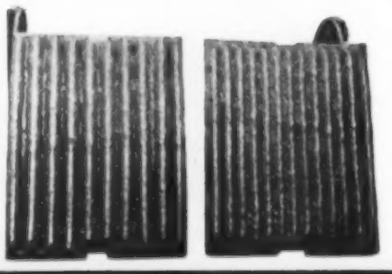
**RELIANCE PRODUCTS**

*Reliance offers a complete line of* Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.



# Crushes 4900 tons!

***WHERE FORMERLY 1800 TONS HAD BEEN THE LIMIT!***



WHEN *your* crusher jaws become seriously worn, don't think of throwing them on the scrap pile. Instead, save yourself the trouble of a costly replacement and an annoying shut-down by doing what one company does,—and that is to hard-face worn crusher jaws with wear-resistant Coast Metals. Here 4,900 tons of material are now being crushed, whereas formerly, with uncoated standard manganese jaws, 1,800 tons had been the limit.

Coast Metals Hard-Facing is of particular value wherever it is difficult or impossible to get new parts, or replace those which are worn out because of the heavier load and longer periods of service to which equipment today may be subjected.

Easily applied by arc or acetylene welding to surfaces, edges, points of new or old equipment of any ferrous metal. Let us tell you how Coast Metals Hard-Facing can meet *your* particular needs.

COAST METALS, INC.
*Plant and General Offices:* Canton, Ohio
*Executive Offices:* New York, N.Y.

# COAST METALS
***hard-facing weld rods***

YOUR EQUIPMENT'S LIFE PRESERVER AGAINST WEAR


*(Continued from page 106)*

collector system of screen pipes emptying into a central well at sufficient depth to allow driving the two tunnels for 300 ft. or more in free air.

Driving of initial portions of the tunnels in free air greatly facilitated construction by dispensing with the need for air decks and locks in the construction shafts, thus eliminating time lost in passing muck buckets and materials through air locks. These savings, of course, were in addition to the economies gained through working in free air or in reduced air pressures throughout the area influenced by the horizontal radial collector system.

Compressed air was not required until the east tunnel had advanced 427 ft. and the west tunnel 422 ft. After compressed air had been turned on in the east tunnel, this tube progressed an additional 788 ft., a total distance of 1,215 ft. from the shaft, under gradually mounting air pressures which, because of the influence of the dewatering system, never reached 26 lb. per sq.in., the pressure at which working hours of sandhogs are reduced from 6 to 4 hr. per day, with a 50c. increase in the daily wage. Similar advance was made under economical air pressures in the west tube to a point 634 ft. from the shaft before work on the two tunnels was suspended by a WPB order. Both tubes have been bulkheaded in the shields to keep out water until work can be resumed. Pumping in the dewatering system has been discontinued, but the collector well and horizontal screen pipes remain in place to be used for dewatering ground ahead of the west shield when the construction crews go back to work.

### Dewatering System

Large capacity of the horizontal radial well system for collecting water from water-bearing formations of sand and sand-gravel had previously been demonstrated in water-supply installations, as noted in *Construction Methods*, May 1941, p. 45. Exploratory borings along the route of the two tunnels in Brooklyn had shown that a satisfactory stratum of coarse sand and small gravel was present in the ground to a depth of about 70 ft. below the surface or 55 ft. below the original water level. The construction shafts, for the tunnels are less than 600 ft. from the water in the nearest dock, although, measured along the line of the tunnels, they lie about 1,400 ft. from the point where the two tubes pass under the bulkhead of Buttermilk Channel at the entrance to the East River. Intervening ground between the shafts and the nearest water is a permeable

*(Continued on page 110)*

TRUCK INSPECTION
5,000 MILE TRUCK INSPECTION CHEK-LIST
Pledged U.S. TRUCK CONSERVATION CORPS
Truck No.
Make
Date
Speedometer Reading
1. Lubricate according to manufacturer's recommendations.
2. Check crankcase oil level. Remove and clean crankcase ventilator. Clean or replace oil filter cartridge. Tighten oil-line connections.
Check differential and transmission lubricant level. Examine for leaks.
4. Fill radiator with water. Check antifreeze if necessary. Tighten all hose connections.
10. Clean fuel-pump strainer, bowl, and carburetor strainer. Test pump outlet pressure.
13. Take hydrometer reading of all battery cells. Add distilled water when necessary. Clean and tighten connections. Tighten battery in box.
14. Adjust clutch pedal for clearance and travel. Check hand brake, connections, and travel.
15. Check oil pressure and ammeter charging rate. Adjust charging rate if necessary.
16. Check all other instruments.
17. Check steering wheel for play. Align front wheels and make all necessary adjustments.
18. Inspect universal joints for looseness.
20. Inspect radius rods.
22. Tighten all wheel nuts.
24. Check tractor-trailer brake
25. Check tractor-trailer fifth wh

**A Standard Automotive Engineer** will help you work out a preventive maintenance schedule to fit your operation.

# 3 steps to help save scarce parts and labor

● While you're looking for every means to stretch the life of parts and equipment, take a tip from almost any preventive maintenance plan; notice how much importance is placed on good lubricating practices.

Most of the steps in these programs are comparatively easy to follow. But lubrication, and particularly motor oil maintenance, still poses many difficult questions. How to determine when oil is unfit for further use? How to establish definite oil change schedules? The answers to these and similar questions vary from fleet to fleet and between various units in the same fleet.

There's where the service of Standard Oil can help you in your fleet conservation plans. First, if you operate in the Middle West, there's a Standard Automotive Engineer located near you who is available for consultation. He is familiar with your maintenance problems, and knows practices and lubricants that have solved similar problems in other fleets. Second, he has the benefit of extensive research, and fleet tests made by the Standard Oil technical staff, to guide him in making recommendations.

A few general suggestions on the care of motor oil under today's unusual operating conditions are given here. But call in one of these Automotive Engineers, just to be sure that the preventive maintenance plan you adopt takes full advantage of the wear- and labor-saving possibilities of good lubrication.

Write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago, Ill., for the Engineer nearest you. In Nebraska write Standard Oil Company of Nebraska at Omaha.

*heat-proofed* **Stanolube H.D.**

**Keep oil clean.** Solids and water are the two greatest enemies of motor oil. These come from oxidation of the oil, from products of combustion in the cylinders, from wear of engine parts, condensation, and road dust. Adequate filtering will prolong the life of any good motor oil and the parts it lubricates.

**Play safe in setting oil-change schedules.** Oil-change periods that were determined under normal operating conditions should be closely rechecked. The importance of conserving replacement parts and labor far outweigh the cost of an additional change of oil. Most units are operating under heavier loads and harder service which may also have changed requirements. Let a Standard Automotive Engineer help you set oil change schedules to present day needs.

**Get the best oil you can buy.** Again, the cost of oil is relatively insignificant when compared with the possible loss of irreplaceable equipment. Fortunately, at this time, a new "heat-proofed" motor oil – Stanolube H. D. – is available – developed by Standard Oil to give the greatest possible protection to heavy-duty gasoline and Diesel fleet engines. This oil is generally available only to the U. S. government and to fleet operators.

Stanolube H. D. minimizes troublesome varnish formation and other engine deposits, along with the resulting clogged oil lines and screens, and dirty filters—conditions that cause stuck valves and rings, bearing failures, and excessive engine wear.

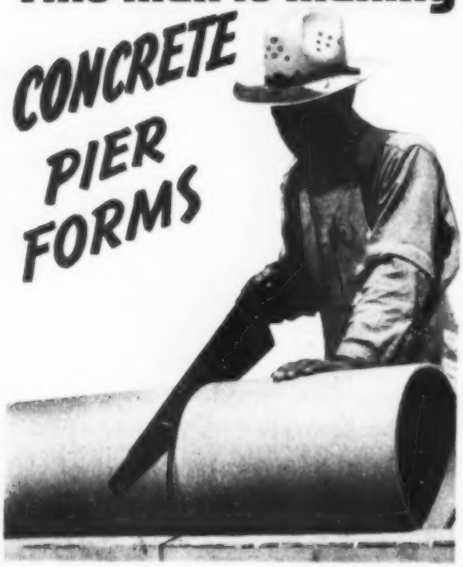
Test Stanolube H. D. in some of the hard-working units in your fleet. Compare engine cleanliness and maintenance costs in these units with those in your other equipment.

*Oil is ammunition . . . Use it wisely*

**STANDARD OIL COMPANY (INDIANA)** STANDARD SERVICE

★ **FLEET CONSERVATION SERVICE**

# This man is making CONCRETE PIER FORMS



## by the hundreds daily
### — any length — choice of diameter

| 9" | 10" | 11¼" | 12" | 13½" | Inside Diam. |
|---|---|---|---|---|---|
| 64 | 78.54 | 100 | 113.1 | 144 | Sq. Inches |

## with Sonotube

*made to size laminated fibre tubing lengths up to 24 feet*

Requiring no critical materials, SONOTUBE is the fastest known method of making concrete pier forms. Simply figure lengths — cut to size — place on footings — back-fill or minimum brace, and pour.

*Widely used and Approved for Cantonments and other Government Construction* — U. S. Army Engineers; U. S. Navy Department Yards and Docks; P. B. A. and F. H. A.

*Write for delivered prices*

**SONOCO PRODUCTS COMPANY**
HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.


*(Continued from page 108)*

mass consisting principally of soft sandy soil with some clay and silt and a certain amount of fill near the street surface and along the riverfront.

Making use of the coarse sand stratum as a dewatering facility, a caisson well was sunk midway between the tunnels 300 ft. from the shafts to a depth of 70 ft. below the surface, 55 ft. below the original water level, and radial screen pipes were jacked through ports in the caisson wall at a depth of 65 ft. below ground level and 50 ft. below the original water table. To encourage gravity flow of groundwater into the collector system, water in the well was kept pumped down to the top of the screen pipes, 50 ft. below the original water table. Two drawings accompanying these notes indicate the layout of the dewatering system and its relation to the two tunnels.

### Screen Pipes

Twelve 8-in.-diameter slotted screen pipes totaling 1,100 ft. in length were projected horizontally to predetermined distances at various compass points, as shown on the accompanying plan, without going under any private property. A jacking apparatus incorporating two Watson-Stillman hydraulic jacks pushed each screen pipe through a port in the caisson wall, successive 8-ft. sections being welded to the pipe as it was projected farther into the sandy soil.

A special bullet-nosed boring head containing slotted perforations was used at the forward end of the pipe. During the jacking operation a temporary inner line of heavy 2-in. threaded pipe extended back through the screen pipe to the caisson well from a dam or throat at the rear of the boring head. This 2-in. pipe, called the sand line, carried a constant flow of water from the boring head into the well, where the water was picked up and ejected by pumps. A temporary rubber plug surrounding the inner pipe near the discharge end prevented escape of water from the screen pipe into the well. Inrushing water entering the 2-in. pipe carried with it fine material from the sand around the boring head, leaving a pack of coarse material surrounding the screen pipe. This pack of coarse sand and small gravel was effective in preventing later washing of fines and loss of ground that might have caused concentrated settlement with resultant damage to buildings and overlying utilities, of which a 16-in. high-pressure water main in Hamilton Ave. was the most important.

Each 8-ft. section of screen pipe (⅜-in. wall thickness) was perforated with 1½x½-in. slots in 39 rings

*(Continued on page 112)*


# Takes Less Time
## TO BUILD BETTER RUNWAYS

## with UNION "QWIK-LOCK"

**Union "Qwik-Lock" Airplane Runway Expansion Joint Assemblies speed up construction. They simplify installation of dowels and joint material and accurate, locking and alignment of dowels. They are designed for fool-proof, trouble-free functioning.**

***Write for Catalog of Construction Accessories.***

**UNION STEEL PRODUCTS COMPANY**
439 Pine Street — Albion, Michigan
SEE OUR CATALOG IN SWEET'S

★ ★ ★ ★ ★ ★

## The WELLPOINT INDUSTRY

has made its contribution to the war effort. Read about it in this Victory Bulletin — yours for the asking. The bulletin tells by word and picture how wet excavation is converted to dry excavation, saving sheeting and cofferdams. On small or large projects, Wellpoint equipment assures speed and economy during excavating and subsequent operations.

FOR SALE OR RENT

**JOHN W. STANG CORP.**
NUMBER TWO BROADWAY, NEW YORK CITY
*also 2322 Newton Avenue, San Diego, Calif.*

★ ★ ★ ★ ★ ★

# Just 3 Words

PLEDGED

CONSTRUCTION EQUIPMENT CONSERVATION

— but what a whale of a lot they mean!

*Photo courtesy of Broderick & Bascom Rope Co.*

**C-o-n-s-t-r-u-c-t-i-o-n**

**E-q-u-i-p-m-e-n-t**

**C-o-n-s-e-r-v-a-t-i-o-n**

***. . . that sums up a big part of today and tomorrow's job***

- New construction equipment is hard to get—that means you'll have to take care of what you have.
- Time-consuming breakdowns must be avoided as much as possible; emergency repairs must be made quickly, and frequently without the usual type of critical materials and parts.
- Jobs *must* be completed on time or ahead of schedule—that means extra work—faster, more skillful operation.

***How About You?***

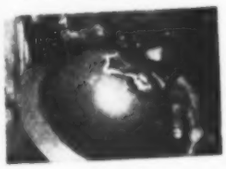
Have you joined the ranks of the hundreds of owners and operators who are doing their darndest to do more with what they've got . . . to make their equipment last longer and work faster? You can tell these men by this 5" red, white and blue emblem on their trucks, tractors, bulldozers, shovels, cranes and scrapers. If you want to show others that *you* are conserving, write for one or more of these free emblems today.

**THE THEW SHOVEL COMPANY**
*Lorain, Ohio*

**THEW-LORAIN** CRANES • SHOVELS DRAGLINES • MOTO-CRANES

STRAUSS

PROTECTOR HELMET SAVES WORKER'S LIFE



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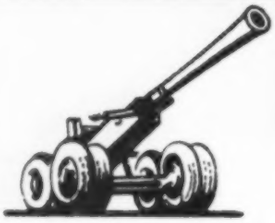

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Jackson VIBRATORS


*(Continued from page 110)*

of 22 slots per ring, a total of 858 perforations. As a special precaution against loss of ground, each screen pipe was fitted on the inside with a slightly smaller strainer pipe with smaller slots. During the installation of the horizontal screen pipes, one of the pipes intercepted a clay lens. As jacking of this screen pipe continued, solid-wall tubing was inserted in the line to close the portion which brought up permanently in the clay pocket.

### Pumping Load

Before the horizontal radial well went into operation, groundwater level in the vicinity of the well already had been lowered about 7 ft. by the action of three gravel-wall wells (adjacent to the construction shafts), originally installed to aid the sinking of the shafts and later put back into service by the tunnel contractor a month before pumping started at the Ranney well. These three wells, each equipped at the bottom with a section of 12-in. screen pipe about 25 ft. long, extended to a depth roughly 20 ft. below the bottom of the shafts and brought up in a sand and gravel stratum above a thick bed of clay. The wells were fitted with Pomona three-stage and four-stage pumps driven by 40- and 20-hp. motors, and the total rated pumping capacity of the three units was 2,100 g.p.m. (1,000 g.p.m. from one, 600 from another and 500 from the third). Discharge lines from the three pumps were joined to a common header which carried the water to three 12-in.-diam. screen-pipe diffusion wells of 500-g.p.m. capacity each. After the horizontal radial well started to lower the groundwater in the vicinity of the shafts, the flow from the three gravel-wall wells decreased from about 1,500 g.p.m. to less than 1,000 g.p.m.

Pumping equipment in the collector well consisted of two Deming 2,200-g.p.m. vertical deep-well turbine pumps and one 750-g.p.m. pump. During the first 15 days of pumping, until the water level became fairly well stabilized, both of the 2,200-g.p.m. pumps operated simultaneously, and the pumpage amounted to 3,000 to 3,500 g.p.m. After the fifteenth day, only one of the 2,200-g.p.m. pumps operated at a time, in conjunction with the 750-g.p.m. pump, and the average flow was maintained at about 2,500 g.p.m. Total pumpage from the collector well and from the three gravel-wall wells after the water table had become stabilized at about 47 ft. below normal in the

*(Continued on page 114)*

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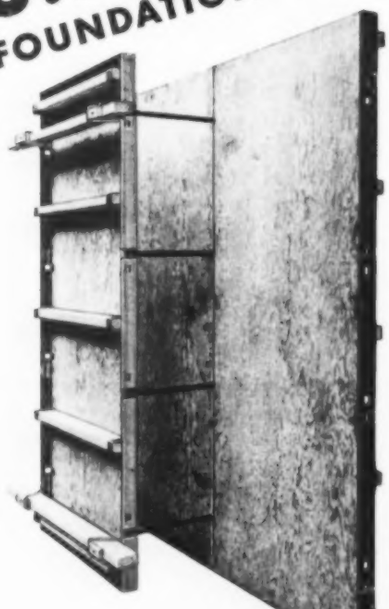

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*(Continued from page 112)*

neighborhood of the collector well was not actually determined but was probably about 3,500 g.p.m., or, possibly less, required to hold the water at this level.

### Tunnel Progress

To avoid settlement of the shallow cover over the tunnels by subsidence into the annular space left by the tail of the shield as the shield moved forward, gravel packing was started by blowing pea gravel through the grout pipes as soon as the shield advanced. During part of the progress, the tunnel crews worked under orders to make only half a shove with the shield at a time and to gravel-pack the annular space behind the tail before completing the shove. Grouting with wet sand-cement grout was started immediately in the gravel pack to prevent loss of ground and settlement. It had been expected that the requirement for immediate grouting in back of the shield would hamper tunnel progress; but, after grouting operations had become systematized, they were carried on without interference to the normal progress of the work.

Cast-iron rings erected in the tunnel lining were 32 in. wide, the same width as the rings previously used by the New York City Tunnel Authority in construction of the Queens Midtown Tunnel. Progress in each of the two tubes generally averaged three rings per day or 18 rings per week. The maximum progress was four rings per day, but this rate never was maintained for a full week. Greater advance of the east tunnel is accounted for by the fact that this tube was able to go ahead while work in the west tunnel was held up for a time until the tunnel authority could acquire title to ten unsafe buildings above the tunnel and authorize the contractor to demolish them.

### Supervision

Design and construction of the subaqueous Brooklyn-Battery vehicular tunnel, 2 mi. long, are responsibilities of the engineering staff of the New York City Tunnel Authority, Ole Singstad, chief engineer, W. McK. Griffin, deputy chief, and Jacob Mechanic, engineer of construction, represented at the Brooklyn end of the project by D. W. Coe, resident engineer. The twin tubes were started at the Brooklyn end through dewatered ground by the George H. Flinn Corp., New York City, as the initial step in its $14,000,000 contract to construct the parallel cast-iron-lined tunnels for a distance of 4,000 ft. to a ventilation shaft in the middle of the East River, off Governors

*(Continued on page 116)*

*Get help in passing license exams from this practical book*

Here is a compact, handy manual by two well-known engineering writers, that meets all needs for quick review of, or reference to the most important elements of designing simple structures — of special value to those preparing for license or registration exams.

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Various methods of computing deflections of beams and trusses are outlined in another chapter, together with applications of these methods to typical practical problems.

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***See what the book gives you:***

—helpful groundwork in the principles of structural mechanics

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—methods of computing deflections of beams and trusses

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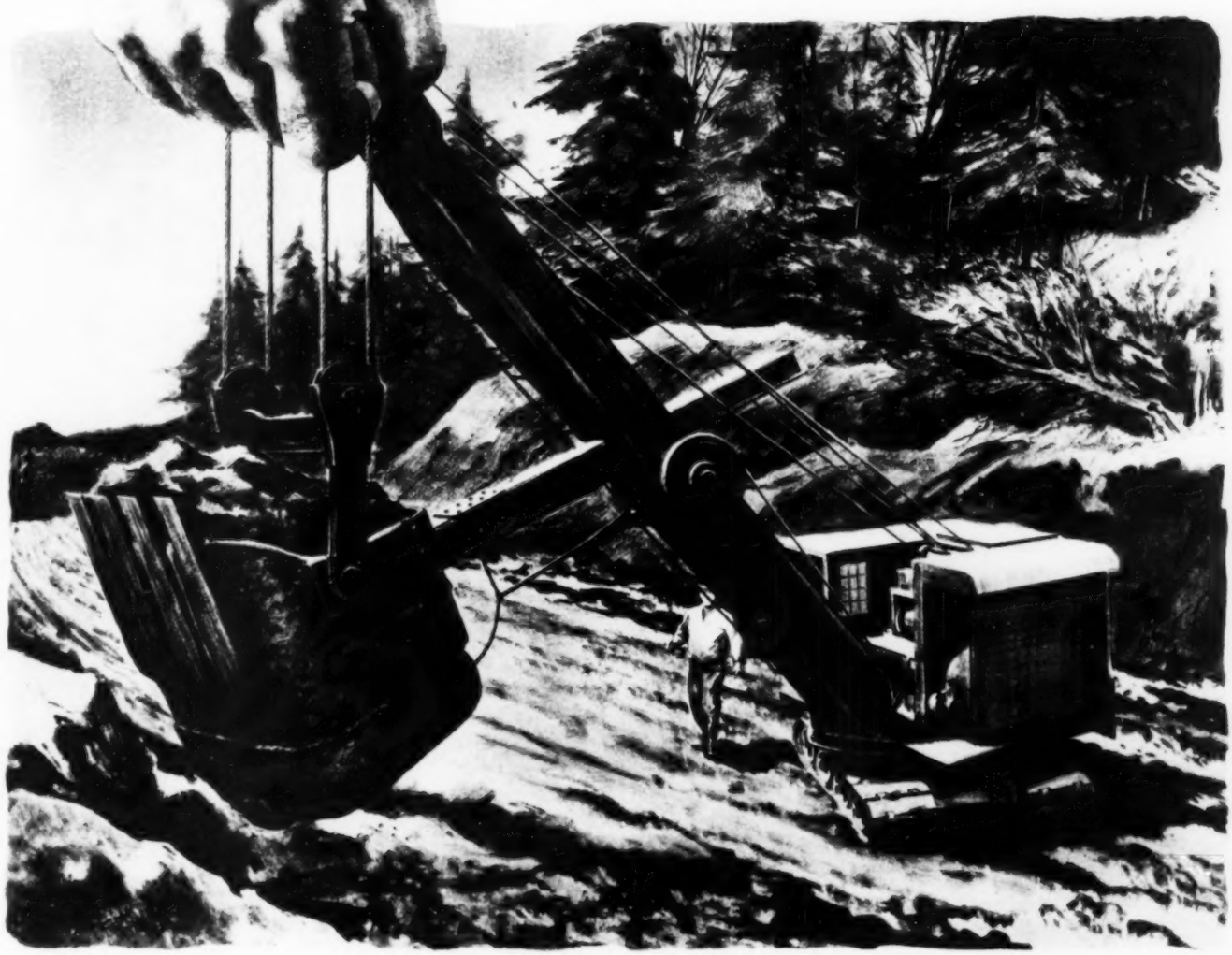

(Continued from page 114)

Island. Cast-iron lining under this contract was supplied by the Tunnel Authority. Plans and procedure for the execution of the contract were worked out under the direction of A. Hjort, chief engineer, George H. Flinn Corp., and construction was carried forward under the immediate supervision of Harry Stripling, superintendent, with Frank Geselle as resident engineer. The horizontal radial well was installed in accordance with plans and supervisory advice by Ross Nebolsine, president, Ranney Water Collector Corp., New York City.

★ ★ ★

## A Pipe Puzzler

**CRITICS OF LAWYERS** and brokers handling technical matters in WPB tell this one: A former top Wall St. executive had been trying in vain to get a lot of pipe shipped. Receiving no replies to many wires he finally called the delinquent mill on the phone. "Why don't you ship that pipe?" "We can't, it isn't threaded yet." "Well, ship the pipe and send the threads later."

★ ★ ★

## Pre-cut and Packaged Lumber For 585 Homes

(Continued from page 50)

areas on which concrete floors were poured). The third crew brought the templates and after laying out the subfloor, marked the exact location for every utility opening and fixture that would be required in the walls.

The wall crew, which of course did nothing else, put up the walls from lower to upper plates, including headers and cripples for all window, door and cabinet openings. Above the upper plate level the roof framing crew took over, placing ceiling joists, rafters, collar joists and sheathing. The shingling crew came next and, after them, the crew that placed exterior trim (including box cornices), set window frames, porch rails and pre-

(Continued on page 118)

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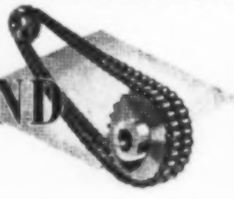

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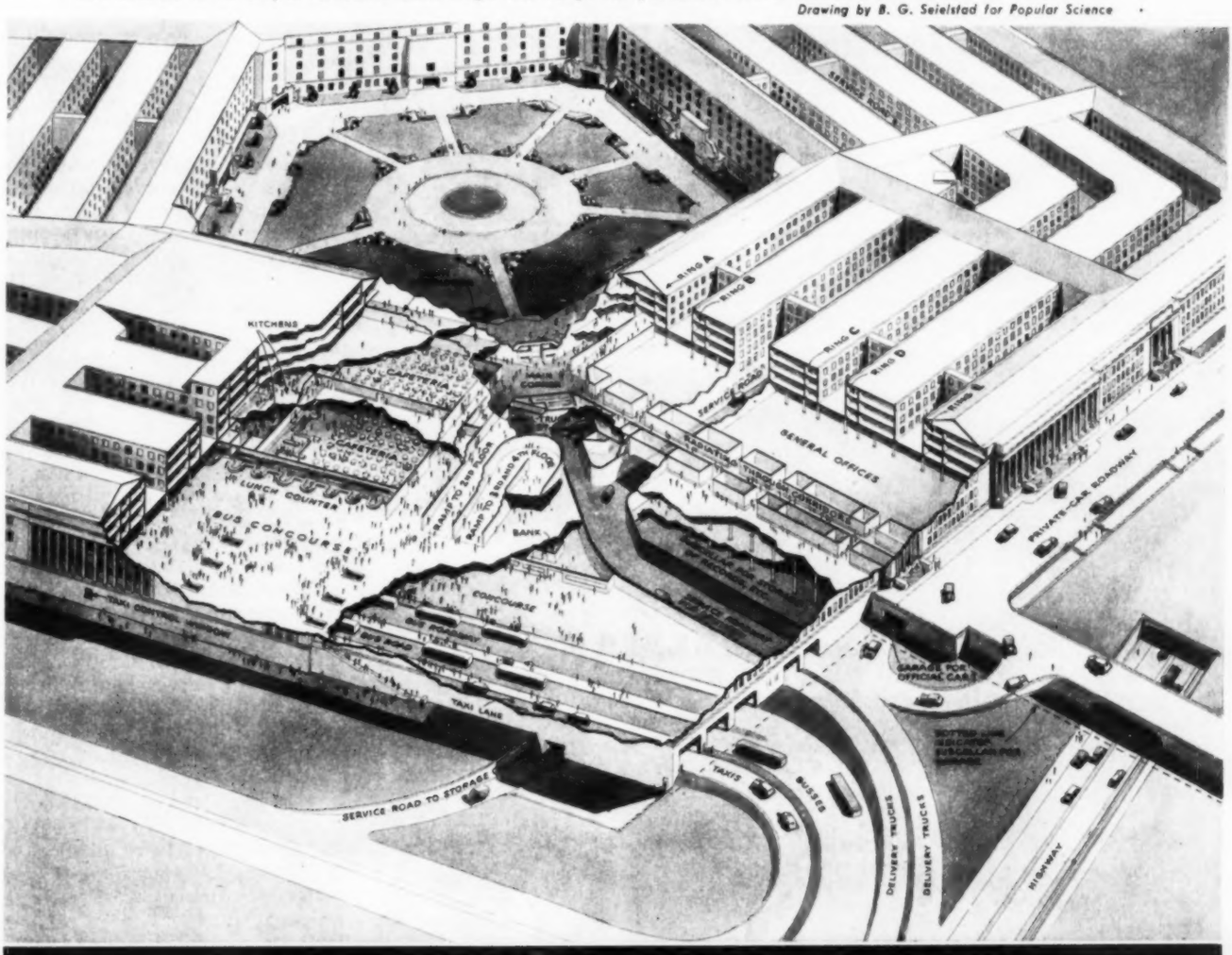
*Drawing by B. G. Seielstad for Popular Science*

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## Chan!

YOURS is a weary task and a bleak existence, Chinese friend, as you toil on a highway for the inhuman Japs. They think themselves your masters — but they're not! For they can't enslave your soul, or break your patience, or kill your will for final victory. We take a lesson from you, Chan, as you look down the highway where victorious armies will march — your armies and ours.

For the war is over here, too — on sea and land, above and below. In open pit mines and quarries skilled men are drilling and blasting coal and ore and stone with which a war is won.

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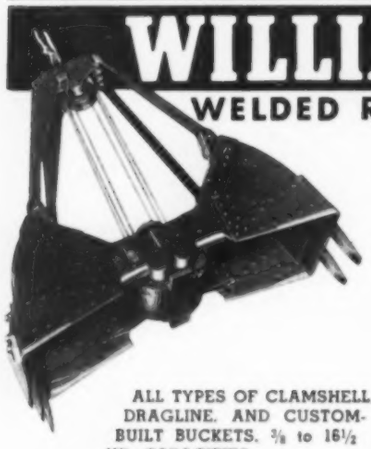
## WELDED ROLLED STEEL CONSTRUCTION



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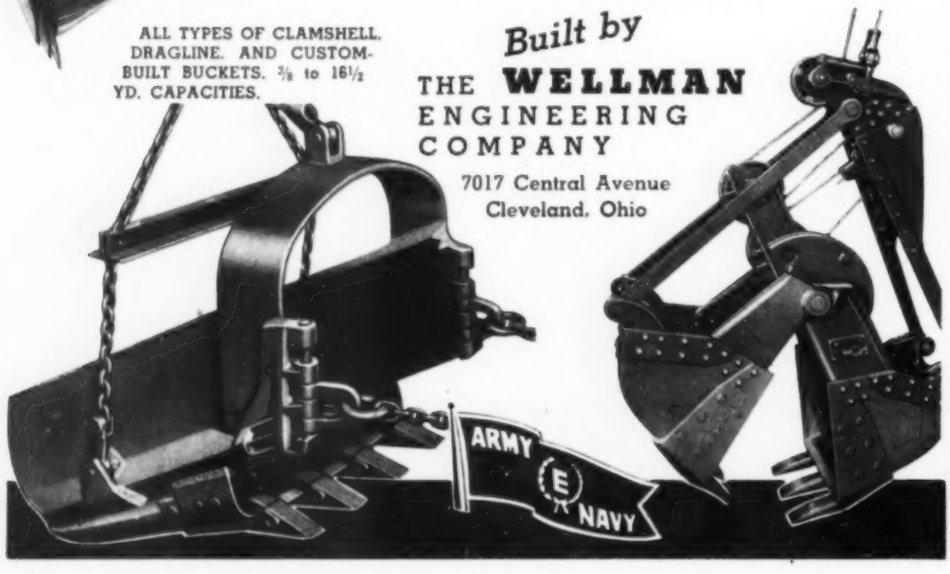



*(Continued from page 116)*

pared interior and exterior walls for plaster.

The crews assigned to utilities were split up to work on each building at the most convenient stages. For example, the rough plumbers brought piping of all sorts up to floor level. Later the crew installing assembled plumbing units, carried these utilities up through the building, including the flashed roof vents. Prefabricated assemblies of gas and water-pressure pipes were put in separately and finally the heating and ventilating crews put on the finishing touches in their line. Similarly, the electrical crew worked in stages. Wire skinning was done by machines in the shop where wires were cut to length and all conduit was bent in advance to the required shapes so that work in the house was merely installing units.

Even the metal lath for plaster and mesh for stucco were pre-formed and cut in the shop. Plaster and stucco was mixed at the central plant and sent out in the "whoopie" truck whose name implied the action expected when these ready-mixed materials arrived on the job.

### Mill Operations

Of major importance in the mill is a double-ended trim saw able to make simultaneous cuts as much as 28 ft. apart and to turn out 60,000 fbm. per shift of precisely cut lumber. The saws are 18 in. in diameter, operated by a 15-hp. motor on a common shaft along which the saws can be moved to obtain the desired spacing. With this rig is an automatic chain feed to maintain a continuous flow of material through the saws. An important advantage in this equipment is the value of the material that can be salvaged where such a high rate of cutting can be maintained. With sawyers wages at $9.60 per 8 hr., it would not pay to take time for salvaging waste resultant from ordinary power-saw operations. With the automatic feed here used, however, four 2x4's on edge can be cut simultaneously at the rate of 60 per min. and the off-fall accumulates so rapidly that it can be economically salvaged for later use where short pieces are needed.

Bins and portable racks were used in the mill for storing the pieces of standard-size as they were cut. Some standard pieces were as short as 11 in., thus making possible use of much material ordinarily wasted. From the adjoining lumber storage yard, materials were handled into the mill with pick-up lumber carriers. On leaving the saws, pre-cut material went either to bin storage or into job loads. To every house went four job-loads, each of a size that could be picked up

*(Continued on page 120)*

PRESSURE DISTRIBUTOR

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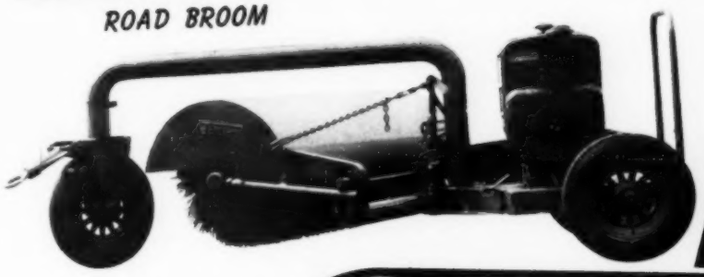

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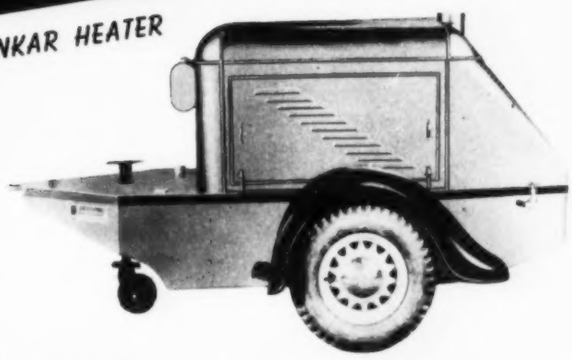

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**SKILSAW PORTABLE ELECTRIC TOOLS**

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★


*(Continued from page 118)*

bodily by the lumber carrier. No. 1, including about 3,000 fbm., had in it all lumber required up to and including the subfloor level. No. 2 included material from subfloor up to the top of the wall plates; No. 3 had ceiling joists, rafters, collars and sheathing. No. 4 included interior and exterior trim sent out in covered racks (usually a week's supply at a time) mounted on sleds so that they could be moved about as desired.

This trim was the one exception to the rule that everything was to be pre-cut. It was found that appearance of finish depends upon precise joints in trim. And trim is sure to require minor variations in each house, despite the greatest care in assembly. Hence, a portable mill, 14x16 ft. in plan, was mounted on skids and moved about the job to locations where interior finish was under way. All trim cutting was done in this portable mill by two men who were able to do all trim cutting required on 10 to 12 houses daily. This portable mill contained three power-driven tools, a Walker-Turner shaper, a Walker-Turner band saw and a DeWalt miter saw.

### Original Schedule

The original construction schedule was laid out for completion of eight houses per day. After the workmen were trained, each stage (with the single exception of stucco and plaster) exceeded the expected rate of speed and in the latter part of the work the average was more nearly 10 houses per day, working only a single 8-hr. shift. For short periods as many as 15 per day were completed. At the peak of operations the number of workmen totaled about 800.

The plaster exceptions noted constitute the uncertain element in predicting speed of erection because of the variation in time required for drying plaster. In an arid climate, the overall construction period can be expected to be less, by two weeks, because of speedier plaster drying, than would be necessary where high humidity prevails. On the Lakewood Park project damp weather during the plaster drying season added more than two weeks to the construction period.

Lakewood City was built by Griffith & Legg, Inc., Los Angeles contracting firm. The first unit was completed under supervision of three highly trained executives who had much to do with the speed made in the construction of Wyvernwood, described in the April, 1940 issue of *Construction Methods*. These men are: C. F.

*(Continued on page 122)*

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**Gremlins — those sly imps who delight in bedeviling our flying forces — will also get your wire rope if you don't watch out.**

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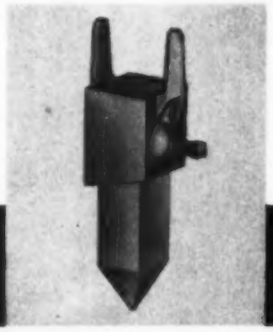

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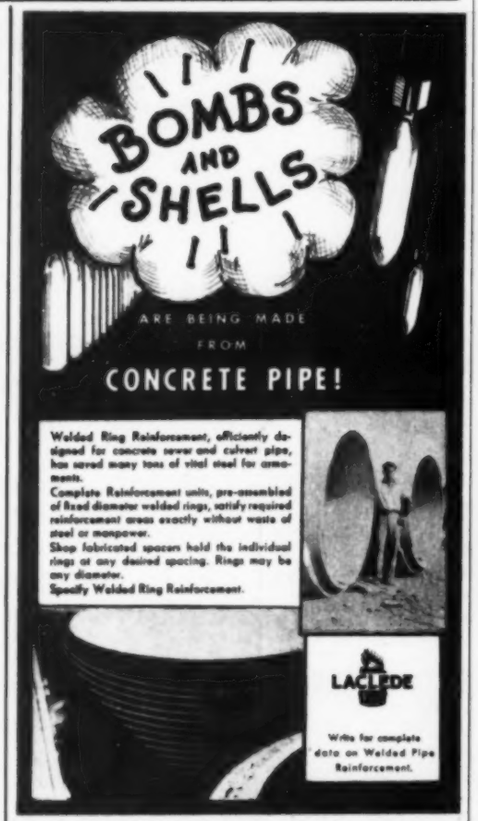
MANUFACTURING COMPANY
Main Office and Works: ELIZABETH, NEW JERSEY


BOMBS AND SHELLS
ARE BEING MADE
FROM
CONCRETE PIPE!
Welded Ring Reinforcement, efficiently designed for concrete sewer and culvert pipe, has saved many tons of vital steel for armaments.
Complete Reinforcement units, pre-assembled of fixed diameter welded rings, satisfy required reinforcement areas exactly without waste of steel or manpower.
Shop fabricated spacers hold the individual rings at any desired spacing. Rings may be any diameter.
Specify Welded Ring Reinforcement.
LACLEDE
Write for complete data on Welded Pipe Reinforcement.

LACLEDE STEEL COMPANY
ST. LOUIS, MISSOURI


*(Continued from page 120)*

Herziger, project manager; Harry L. Brittain in charge of purchasing and coordination; and William Stearns, general foreman.

★ ★ ★

# Timber Construction
## Saves 30,000 Tons of Critical Metals

*(Continued from page 71)*

sticks, separated by spacers, and having cross-sectional dimensions of 17½x34⅜ in.

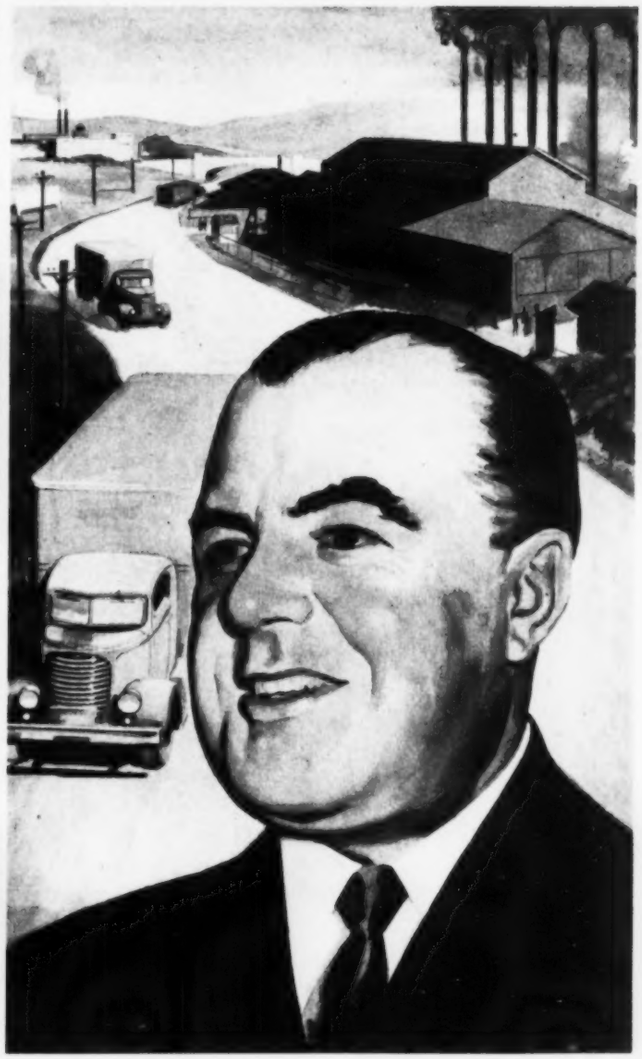
Auxiliary structures, including boiler house, administration and personnel building, cafeteria, paint shop and hangar represent an additional saving of several thousand tons of metal. Except for the steel pipe and valves in steam lines and the sprinkler system for fire protection it is difficult to find any metal in the vast structure much larger than a nailhead or bolt.

The plant's model fluorescent lighting system, probably the last word in factory illumination, alone saved 132 tons of steel by the use of pressed wood reflectors with a synthetic white enamel surface, instead of porcelain

**MASSIVE BASE** of laminated wood column rests on concrete pier to which it is fastened by anchor bolts.

enameled steel, at no loss in lighting efficiency. Copper wiring was reduced one third by the use of a modern distribution system, and a new double-duty lighting mechanism (4-lamp instead of 2-lamp ballasts) in the fluo-

*(Continued on page 124)*



**1. Greatest team on earth!** Unloading "Jeeps" from a U. S. cargo plane (above) demonstrates one phase of the teamwork between various branches of the U. S. Armed Forces. On all fronts, America's team-fighting soldiers and sailors are "in there pitching." Their smoothly coordinated teamwork and heroic determination to win Liberty for the world will see them through to Victory. We on the home front can benefit from their example.

**2. "On all fronts** — war, industrial, farm, home — teamwork spells success," says Ted V. Rodgers (above), President of A.T.A. His duties keep him in Washington much of the time. But Rodgers is still the anchor man of his own "team," the Rodgers Motor Lines, Inc., of Scranton, Pa. As President, Rodgers studies detailed daily operation reports; personally acts to encourage conservation. "Better teamwork will help conserve vital vehicles," Rodgers says.

## "TEAMWORK SMOOTHS THE ROAD TO VICTORY"

—TED V. RODGERS, President A.T.A.

ARMY E NAVY
For Production "Well Done"

Take a tip from Ted V. Rodgers, President of the American Trucking Associations, and put *your* "vehicle conservation team" in training now! Timken's new vehicle conservation program includes operators' aids, driving helps, complete data for maintenance men, plus a full-color sound film on "TEAMWORK." Representatives of our Motor Transport Cooperative Service Department are ready to bring these practical helps to your organization. Mail the coupon today for a free showing of the film.

# TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICHIGAN
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

THE TIMKEN-DETROIT AXLE CO.
400 Clark Ave., Detroit, Mich.

☐ We are interested in seeing the film "Teamwork" (free).
☐ Send complete axle maintenance aids (free).

Name _____

Address _____ City & State _____

# DAVEY
## Truck Compressors

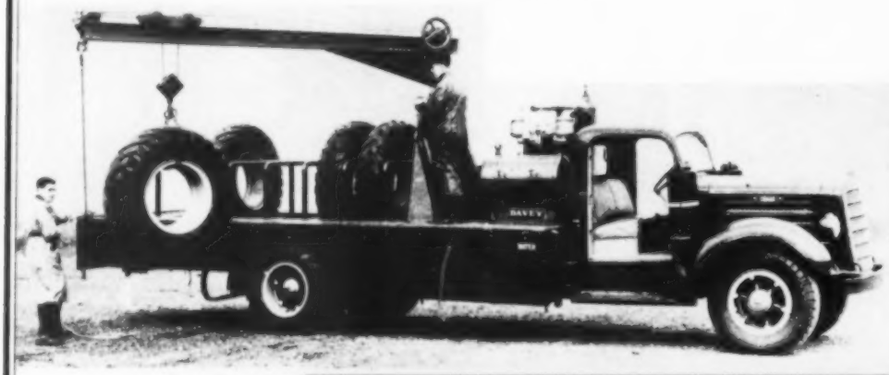
**Serve Dual Purpose**

**DO MORE JOBS AT LOWER COST**

● Not only do these trucks serve as mobile units for compressed air service but with their split propeller power take-off you can use the same truck power unit for other jobs.

Here is a dual purpose unit illustrated which serves as a hoist and also carries an air compressor for general utility, operated through the Split Propeller Power Take-off.

Keep your truck power busy all of the time by equipping it with a Davey power take-off unit. This power take-off can be mounted on your present truck or included on your new truck equipment.



Davey also builds a full line of heavy duty portable and industrial compressors, pneumatic saws, and pole hole diggers.

**DAVEY COMPRESSOR CO.**
*Power Take-Off Division*
KENT • OHIO • USA



*Portable and Stationary*

# ASPHALT MIXING PLANTS

**That Cut Moving and Mixing Costs**

THE
*"Brass Brain"*
(FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

★ Hetherington & Berner asphalt plants incorporate the latest developments in design which have proved their efficiency in performance. Specifications conform to the most rigid State and City requirements both as to engineering design and safety regulations. Stationary and portable models in a wide range of mixer sizes and bin capacities. Patch plants capable of producing small quantities efficiently and economically. H & B engineering service, based on nearly 50 years of specialized experience, and a complete stock of parts, insure the efficient performance of H & B asphalt plants. Write for Bulletin CM-260.

HETHERINGTON & BERNER INC., INDIANAPOLIS, INDIANA

H&B

*Hetherington & Berner*


*(Continued from page 122)*

rescent fixtures saved both copper and aluminum.

### Critical Metals Saved

With fiber downspouts; with asbestos and plastic pipe instead of steel to handle water and process lines; with wooden pipe instead of reinforced concrete in the drainage system and wooden manhole covers; and with non-metallic ventilating ducts and heater and radiator housings, there isn't any metal where one would most expect to find it. The plant has wood sash instead of steel, fabric instead of metal in the flashing that waterproofs the edges of the roofs, and asbestos-cement siding instead of masonry, all installed at a great saving in manpower and expense.

Even the long concrete runways serving the plant were designed without reinforcing steel, which was almost entirely eliminated throughout the project.

Directing construction of the huge plant was Albert S. Low, vice-president and chief engineer of The Austin Co., while Army Engineer supervision was the responsibility of Major William A. Bonnet, area engineer.

★ ★ ★

# *Soil-Cement Base*
## Built by Road-Mix Methods

*(Continued from page 67)*

strip of paving. The spreader mechanism consists essentially of a rotating drum from which cement is discharged at a predetermined rate per lineal foot, regardless of the speed of travel, so that the movement of the equipment need not be at constant speed. The cement discharge rate is controlled by a sprocket attached to one of the trailer wheels through a gear box which drives the distributing drum, thus synchronizing drum rotation with the speed of the wheel. A clutch on the shaft permits the starting or stopping of cement delivery as desired.

On project A the prescribed quantity of cement was 45 lb. per lin. ft. for a 6-in. soil layer thickness, corresponding to a 3-ft. wide ribbon of cement 1.9 in. thick deposited by the spreader. On project B, calling for a theoretical total of 63,479 sacks of cement, the actual quantity deposited

*(Continued on page 126)*

# HE KNOWS HIS BUSINESS

Whether controlling the split second movement of 70 trains a day, or producing friction materials for industrial equipment, it's "know-how" that counts.

Raybestos knows how. That's why there is a Raybestos brake lining and friction *specially engineered* to meet the *exact* requirements of every make and model of machine that you operate!

Specify Raybestos—the friction materials that have proven *correct* and *dependable* for more than 37 years.

Fastest deliveries assured through your local Raybestos distributor. See him or wire us.

**THE RAYBESTOS DIVISION** *of Raybestos-Manhattan, Inc.*, **BRIDGEPORT, CONN.**

RAYBESTOS IS AMERICA'S BIGGEST SELLING BRAKE LINING

Raybestos INDUSTRIAL FRICTION MATERIALS

FOR SHOVELS • CRANES • HOISTS • TRACTORS & EARTH MOVERS

# NO TIME FOR "TIME OUT"!

ABSENTEEISM, with its terrific toll from war work, springs from two sources. One is just plain "don't give a damn". The other is actual illness. Much of the time lost through easily contracted illnesses like colds and sore throat can be avoided . . . through vigilance at possible contagion points.

● **Better Contagion Control Reduces Sick-Absenteeism**

Health protection starts at contamination points such as the drinking water tank or bucket where a tin cup or dipper is often used by many workers. Check this possible chain of mouth-to-mouth contagion! Safe, clean Dixie Cups, used but once and thrown away, offer helpful protection at this vital point.

● **Take the Water to the Men**

For workers and crews spread out on location where drinking water is not readily accessible, the modern water boy carries a drink to the men in a Dixie-Vortex Portable Water Carrier with individual paper cups. Important time is saved. Men are adequately watered at their work, health is protected.

*For complete information, catalogs, and prices, write today!*

*Dixie Cups and Vortex Cups are made at Easton, Pa., Chicago, Ill., Darlington, S. C. and Toronto, Canada*

**DIXIE CUPS**

ONE OF THE VITAL HEALTH DEFENSES OF AMERICA AT WAR


*(Continued from page 124)*

by the spreader was 63,715 sacks, an excess of only 236 sacks or 0.37 percent, equivalent to 2 oz. per lin. ft.

Over the area covered by project A the cement spreading equipment made one trip for each 7½-ft. width, depositing a 3-ft. wide ribbon of cement. The spreader was followed by a tractor-drawn scarifier, loosening the soil over a 7½-ft. width. Mixing of the loosened base material and the cement was done by three Gardner road-mix machines. The first of these, immediately behind the scarifier, completed the dry mix by picking up and working over the top 9 in. of the loose soil layer. Then the second mixer performed much the same operation on the same material except that this time, by means of a connection to an accompanying tank-truck, water was added as the materials were mixed. The third mixing, without additional water, left the cement thoroughly admixed with the soil and with moisture well distributed.

All three mixer units moved along successively at about the same speed and thus completed preparation for rolling operations on a 7½-ft. strip at about 1½ mph. The third road-mix operation left the material in a windrow over which a blade grader was then run with the blade set for distribution to a 6-in. layer in a strip 7½ ft. wide. After the blading operation a three-wheel, 12-ton power roller compacted the surface in three passes, followed by final rolling with a pneumatic-tired trailer.

### Oil Emulsion Applied

Immediately after rolling on project A, a mixing-type oil emulsion (SS-1) was applied to prevent loss of moisture. This solution was diluted with equal quantities of water and spread at the rate of ¼ gal. of the diluted solution per square yard. This same curing treatment was used on both the 4- and 6-in. surfaces.

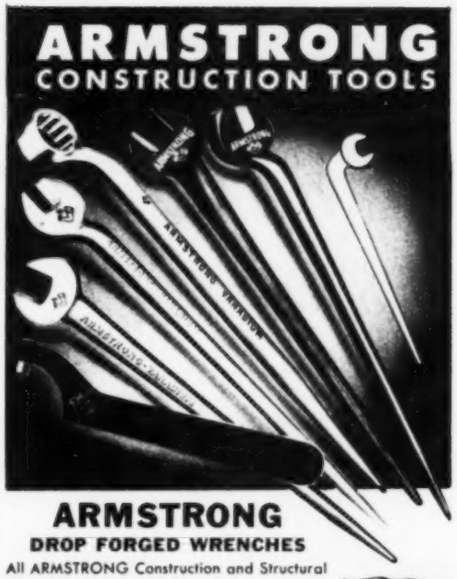
After a minimum of 7 days of curing, the 4-in. base was finished with a seal coat of penetration type emulsion (R.S.-1) at the rate of 1/6 gal. per sq.yd., which was covered over with stone chips (1/8 to 3/8 in.), broomed and rolled. The 6-in. thickness was given a tack or binder coat of the same emulsion (RS-1) applied at the rate of 1/8 gal. per sq.yd. and then covered with a 1¼-in. layer of natural rock asphalt (Calrock).

### Unit Costs

On project A, it was stated by H. J. Brunnier, consulting engineer, who held the architect-engineer contract, that unit costs to the government, based on the completion of 25,000 sq.yd. in 10 hr., were as given in the

*(Continued on page 128)*


**ARMSTRONG CONSTRUCTION TOOLS**



**ARMSTRONG**
**DROP FORGED WRENCHES**

All ARMSTRONG Construction and Structural Wrenches are drop forged from special analysis tool steel, and heat treated. Openings are accurately machined, handles are long and tapered for ease in lining up bolt holes.

"Construction" Wrenches in Chrome-Vanadium or Carbon Steel—with 15°, 45° or 90° angle heads with openings of from 7/16" to 2".

"Structural" Wrenches with straight heads and off-set handles, in Chrome-Vanadium or Carbon Steel in the sizes listed above.

"Box Socket Structural Wrenches, in Chrome-Vanadium only, with double hexagonal (12 point) openings from $1\frac{1}{16}$" to $2\frac{9}{16}$". (Recommended wherever an open end wrench is not required because of these safety convenience features.

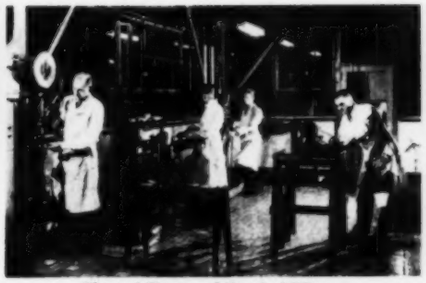
*Write for Catalog*

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
337 N. FRANCISCO AVE. CHICAGO, U.S.A.
Eastern Warehouse & Sales: 199 Lafayette St., New York

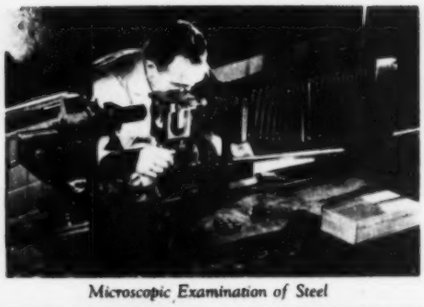
**UNION**

EST. 1900
**Union Iron Works, Inc.**
ELIZABETH, New Jersey

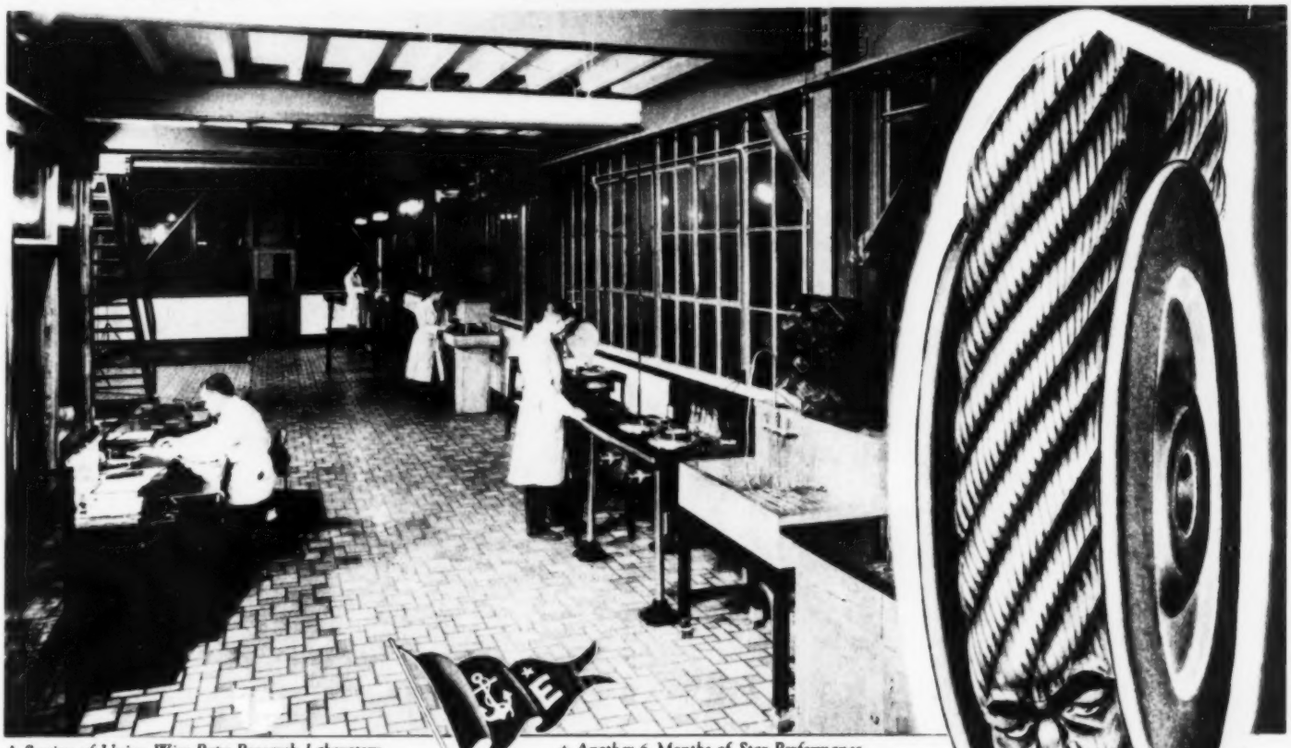
*Testing Steel for Hardness*



*Physical Testing of Finished Wire*



*Microscopic Examination of Steel*



*A Section of Union Wire Rope Research Laboratory*

*★ Another 6 Months of Star Performance In War Production*

# BIRTHPLACE OF TOUGHNESS

Out of some 4000 steel formulas, relatively few are suited to wire rope making. From long years of experience, Union Wire Rope engineers and metallurgists have determined upon a steel formula for each type of Union Wire Rope.

To be certain each heat meets specified analysis, steel is examined under a powerful microscopic photo and scanning machine (see photo at top left). In minute detail its micro structure and inherent grain size are analyzed. From this analysis is determined the controlled heat-treatment and the subsequent processing operations it is to be given in the mill to secure wire meeting the exact specifications desired.

Samples of the wire then are brought back into the elaborate Union Wire Rope laboratory. First it is subjected to hardness tests under a delicate pendulum machine (see center photo above) and its Brinell hardness determined. Then in a group of six physical testing machines (see photo at top right) the actual tensile strength, torsional values, fatigue life, ductility and hardness of wires of all grades and sizes are checked. Here, before the wire is stranded, the ultimate tensile strength, toughness and durability of Union Wire Rope is pre-determined.

Many other research activities are constantly carried on in Union Wire Rope's laboratory. Although not pictured here, there are scientific research machines for testing wire coatings by the salt spray, Preece, strip test and wrap test methods.

Here tough wire is born and on long lines of stranding machines (many of them designed by our own engineers) it grows into Union Wire Rope of maximum strength and greater toughness to withstand harder use and longer service.

UNION WIRE ROPE CORPORATION
2160 Manchester Ave., KANSAS CITY, MO.

*Tulsa • Houston • Chicago • Salt Lake City • New Orleans • Monahans Portland • Ashland, Ky. • Atlanta*

B-43

**SEND FOR ROPE DOPE** • Tells how to make wire rope last longer—how to handle and install it—how to socket or splice—and a wealth of other helpful information.

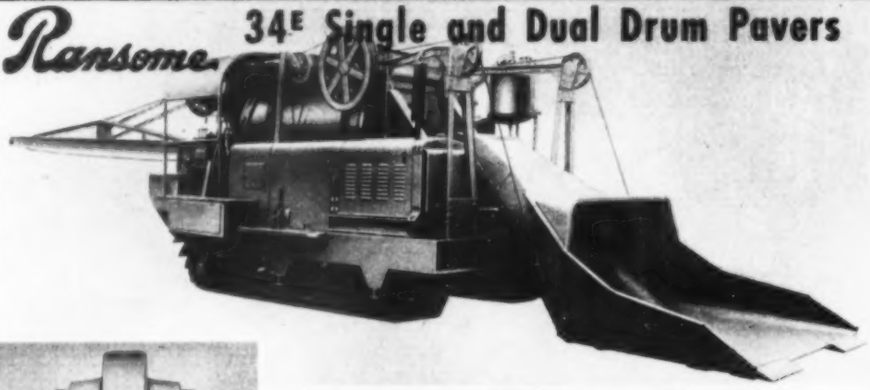
WHEN YOU NEED PREFORMED WIRE ROPE
SPECIFY **union-formed**

UNION WIRE ROPE CORP.

**union** *Wire Rope*

**"THE ULTIMATE LOW COST WIRE ROPE"**

Ransome 34E Single and Dual Drum Pavers



*High carbon heat-treated, oil-quenched electric steel crawler shoes for long wear.*

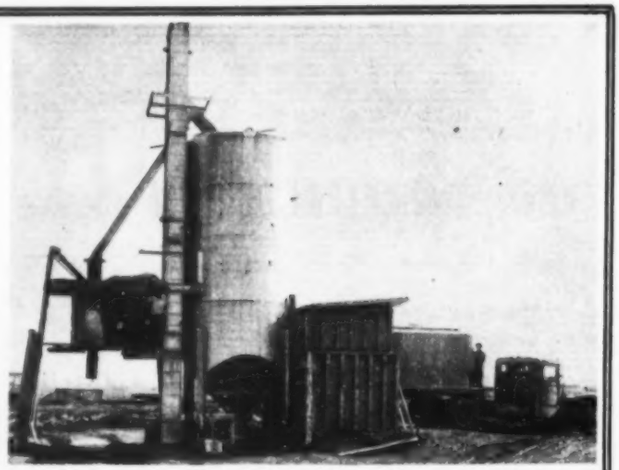
**Advantages of Ransome Crawlers . . .**

- Long crawler (with 13 rollers) permits low ground pressure without sacrificing weight.
- Narrow overall width of crawlers for working outside of forms or on 10 to 11 ft. shoulders.
- Crawler drive chain conservatively rated (112,000 lb. breaking point).
- 13 crawler rollers with 2 7/16" shaft have 3⅛" bearing surface on pads.
- Use of 3 crawler frame axles permits equal distribution of weight on crawlers and prevents frame distortion.
- Adjustable outboard bearing prevents strain on crawler shoes, drive chain and sprockets.

RANSOME MACHINERY COMPANY
Dunellen New Jersey



AIRPORTS TODAY—
Highways Tomorrow



The war comes first today with all of us. Vital airports must come before highways. But necessary materials will not always be on the critical list—gasoline will not always be rationed. America's greatest highway development is on its way.

When post-war highway expansion gets under way, you will find Butler bins, batchers, and bulk cement plants again playing their part in the program. Today these plants are building airports—like the portable bulk cement plant above, which stores 500 bbls. of cement and ships in only four quickly assembled pieces. In war as in peace, look to Butler for leadership; the best is less expensive in the end.

BUTLER BIN COMPANY • WAUKESHA WISCONSIN


*(Continued from page 126)*

accompanying table. The table gives data for surfacing of 4-in. thickness only. For the 6-in. surfacing, cement and water were directly proportional to the thickness and other items did not vary appreciably with the additional material. Roughly the 6-in. surfacing cost was about 56c. per sq.yd. Mr. Brunnier also reported that tests on compression cylinders cast from the material during mixing, showed compression strengths in 28 days of 1,200 to 1,600 lb. per sq.in.

The bulk cement trucks, operated by International Cementers, Inc., Long Beach, Calif., were used on both projects. MacDonald-Kahn, Inc., San Francisco, held the general contract on project A, which was carried out under supervision of the U.S. Engineer Department.

★ ★ ★

# Washed-Out Bridge Repaired and Replaced on Piers

*(Continued from page 61)*

steel cross member which supported the floor stringers in the same manner. Only four skids were used, one under each end of the truss. The trusses were braced across the top by placing an 8x8-in. timber across the top chord, and with the use of two ¾-in. bolts on both ends and a short piece of 2x4 in. underneath the bottom side of the top chord, the truss was held in a rigid upright position. (Fig. 3).

### Bracing Truss

One-inch wire cable, together with turn-buckles was used to protect the structure from any undue strain, to keep it square, and to prevent the steelwork from getting out of line. (Fig. 4). Two of these cables were placed on the top chord, running from the intersection of the top chord with the cross timber which was placed to act as a brace to the same point at the other end, and on the opposite side of the bridge. Two more of these cables were placed across the bottom, being fastened around the end of the truss near the bearing plate and running to the opposite corner. Two additional cables were

*(Continued on page 130)*

Motor Grader on ALCAN Highway

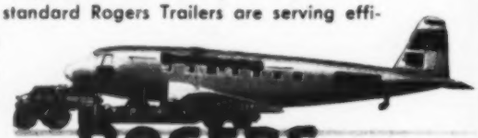
# GALION

The Galion Iron Works & Mfg. Co.
Main Office and Works: GALION, OHIO

Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers, or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.



ROGERS
LOW BED—HEAVY DUTY
TRAILERS

ROGERS BROTHERS CORP.,
220 ALBION, PENNA.



*The Care and Feeding of Rock Crushers*

No. 4 of a series of advertisements published in the interests of national economy and to aid those users of crushing equipment unable to secure new units during the emergency.

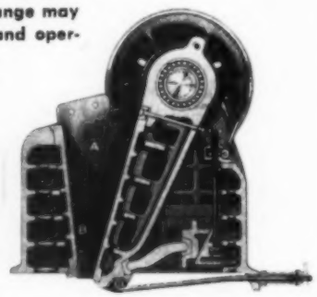
## What Operating Speed for Maximum Output?

**As with a gasoline or diesel engine, there is an ideal speed at which crushers will provide maximum efficiency. Operating below that range may provide increased crushing efficiency at the expense of volume; and operating above that range may provide decreased crushing efficiency and decreased volume, because of choking and premature wear of the jaws and other parts.**

**Crushers should be operated within the range of speeds indicated on the name plate. Universal engineers are familiar with all sorts of rocks, ores and slags and are glad to be consulted where special cases indicate higher or lower than standard operating speeds.**

**When a crusher is run too fast, it will not grip the rock. This results in slippage and causes rapid wear of the jaws. Do not operate on the theory that every revolution of the eccentric shaft gives a crushing blow and, therefore, increased capacity.**

**There is a peak speed which, when exceeded, causes decreased production. Therefore, the increased speed over the peak is wasteful and wears out equipment much faster. *At high speeds, rock floats in the crusher and jaws cannot grip it readily.***



When a crusher is run too fast, the jaws tend to squeeze material back up into the feed opening. When run at the proper speed, the jaws take a big bite at the top (A) and a powerful finishing bite at the bottom (B) — two crushing blows with each revolution of the eccentric shaft.

**UNIVERSAL ENGINEERING CORP.** *(formerly Universal Crusher Co.)*
327 8th ST. WEST CEDAR RAPIDS, IOWA

**UNIVERSAL**
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS


*(Continued from page 128)*

used as traces and were placed parallel to the truss and on the outside, connecting the two 12x14 in. cross timbers, which were placed under the bearing plates on each end. This was done in an effort to distribute any strain on the front timber caused by the pulling operation.

We were unable to purchase turnbuckles large enough to take up the slack in these cables and, therefore, used a standard 1 in. guard fence turnbuckle, which is about 9 in. in length. This, we cut in half, and each half was inserted into the end of a piece of 2 in. wrought iron pipe, 30 in. long and welded in place. (Fig. 4). A 1 in. hole was placed in the center of the pipe through which a bar was inserted for turning purposes. In this manner a 2 ft. takeup was had on each of these cables which worked out successfully.

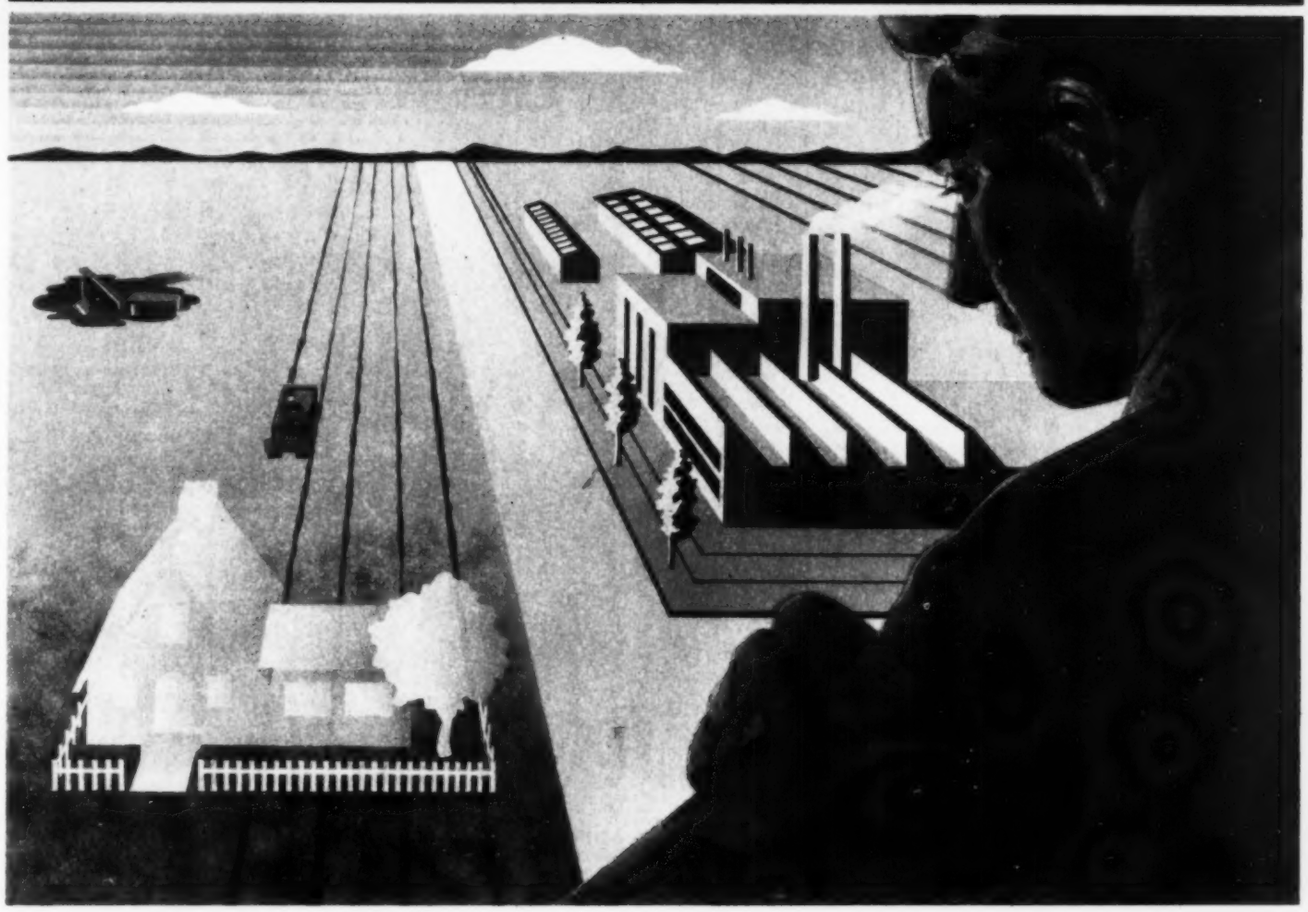
### Tractor Haulage

After the skids were placed, and the bracing of the structure completed, a Caterpillar tractor was used for moving the structure. A heavy chain was attached to the 12x14-in. cross-timbers on the upstream end, and this was connected to the tractor. Some 8 to 10 in. diameter green mine prop timbers then were placed under the skids, not to act as rollers, but for a base on which to move the skids. Because of the green condition of the props, we found that the sap contained in these timbers acted very much in the same manner as grease would under the skids, and with very little difficulty this method was used for moving the bridge up to the falsework which was placed between the repaired abutments. As the bridge moved forward, the props which were released from under the rear end of the skids were carried forward, and again placed under the front end. The bridge was moved approximately 700 ft. upstream on the streambed, and then moved up the bank on the right side. A bulldozer was used to remove the boulders in the stream from the course on which the bridge was moved. It was also necessary to grade an approach about 20 ft. wide on the bank of the stream to provide a ramp on which to drag the bridge up from the streambed. This ramp was made by the bulldozer and was about 60 ft. long and on a 7 percent grade. We experienced no difficulty whatsoever in pulling the bridge up this ramp on to higher ground, where we stopped the moving operation long enough to make necessary repairs.

Because the steel cross members which carried the floor stringers had been damaged by logs and boulders encountered by this structure when

*(Continued on page 132)*

# Mr. Chekovski looks at his new home



***If this war housing project comprising up to 100 or more houses were in your hands, you probably could complete it faster with Atlas High-Early cement—and save time in wartime.***

STAN CHEKOVSKI and thousands of others enrolled in our industrial "army" must have new homes so that war production can be increased in nearby plants. But how soon? Uncle Sam wants war production on the double-quick. New housing for war workers was needed yesterday.

You know an answer to the question. *Atlas High-Early cement.*

Despite cold weather, this speedy cement will help hurry up completion of war housing. This cement has had an important role in helping to place this country on an all-out war basis not only in housing, but in factories, airports, naval bases, cantonments, access roads.

Check the facts in the adjoining box. Use Atlas High-Early cement whenever you need durable, serviceable concrete—*in a hurry.* Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York City.

**OFFICES:** *New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*

**CHECK ON ATLAS HIGH-EARLY**
**for Wartime Construction**

Atlas High-Early cement gains strength rapidly—produces serviceable concrete in one-fifth the usual time on some jobs. So it—

1. ***Permits earlier use*** of concrete, and thus gives owner earlier occupancy.
2. ***Saves manpower*** when such conservation is needed most—releases men for new jobs more quickly.
3. ***Conserves lumber.*** Forms may be stripped sooner—often in 24 hours instead of from 3 to 5 days—and re-used. Hence fewer sets of forms may be needed, saving time, labor, and lumber.
4. ***Shortens time required for protection and curing*** as much as 70%. This saves fuel and releases tarpaulins and salamanders for other work.
5. ***Reduces overhead*** by saving time, manpower and equipment.

CM-H-52

**SAVE TIME IN WARTIME WITH**

# Atlas High-Early Cement

**A UNIVERSAL ATLAS PRODUCT**

*(Continued from page 130)*

it was washed downstream, it was necessary to replace them with new I-beams. This was done after the structure was out of the stream and before it was pulled out over the falsework which had been built between the repaired abutments.

### Repair Work on Abutments

Considerable repair work was necessary on both abutments before the bridge could be replaced. One abutment was almost entirely destroyed, and about 20 percent of the other had to be replaced. New concrete bridge seats were poured on top of these masonry abutments, and after the bridge was replaced, concrete backwalls also were placed.

Timber bents, securely braced, and on 10-ft. centers, were used as falsework between the abutments to carry the plank on which 3 in. rollers were used under the skids when the bridge was moved out over the creek. The planks used for this runway over the falsework were the old floor stringers which were removed from the bridge before the jacking was done and measured 4x12 in. The same tractor was used for motive power in this operation as was used to pull the bridge out of the creek.

### Cost of Replacement

It was necessary to replace two-thirds of the old plank flooring, and one-third of the 4-12-in. stringers, due to the poor condition of the old ones. The total cost of moving this bridge, including the cost of the new steel cross members, plank flooring, timber stringers, repairs to abutments and placing the required fill in the bridge approaches was $1847.56, broken down in the following manner:

Labor cost, $778.90; material cost, $412.28; equipment cost, $656.38; total cost, $1847.56.

Work was started on June 22, 1942, and completed on July 20, 1942. An average of seven men and a foreman was used on this work. On two different occasions, when the jacking operation was in progress, it was necessary to suspend work on account of high waters, and on two other days on account of rain. A total of eighteen 10-hr. days was actually worked on this project, and the actual time for moving the bridge was 16 hr. The remainder of the time was spent in jacking, bracing, repairing both bridge and abutments, and building falsework. This bridge was also painted, and this time is included in the total days worked, but no costs are shown because this work was charged against maintenance repairs.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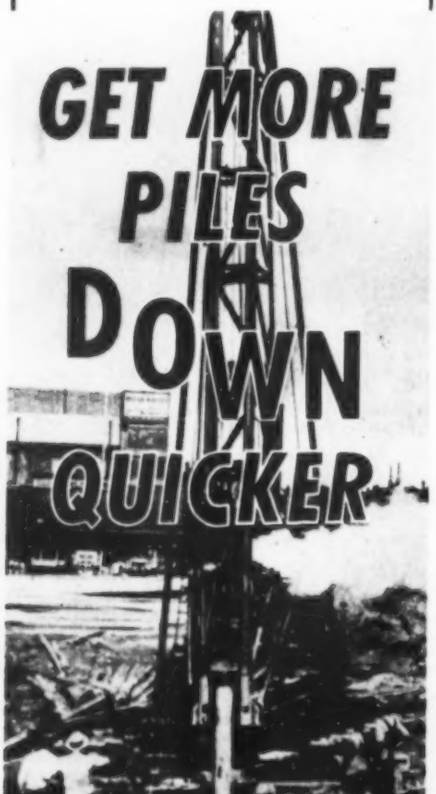


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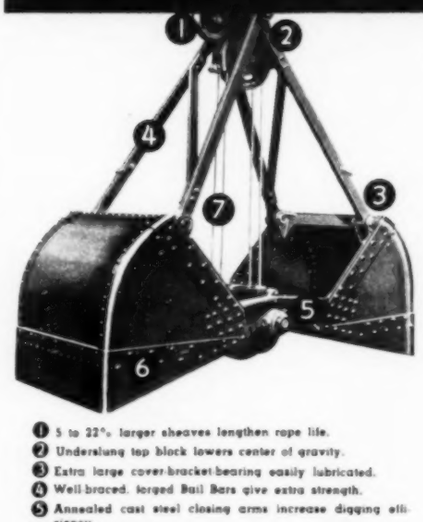


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THE GORMAN-RUPP CO., Mansfield, Ohio

# Bridge Deck Paved With *Pumped Concrete*

*(Continued from page 53)*

This method of supporting the forms took care of the area between the girders, which are set on 20-ft. 3-in. centers. The distance from a girder to the nearest stringer is 7 ft. 1 in., c. to c., and the two lines of stringers are spaced 6 ft. 1 in., c. to c. For the outer portions of the roadway slab extending beyond the top flanges of the girders, a different method of form support was employed, as indicated by photographs. A steel channel incases the outer edge of the concrete deck. The plywood form for this portion of the slab was supported at the outer edge by ½-in. bolts inserted through holes cut in the lower flange of the channel at about 4-ft. centers. These bolts carried a double 2x4-in. wale which was drawn up tight against the bottom of the form.

As forms had to remain in place for 7 days after concrete had been placed, the contractors stocked the job with sufficient lumber to form 1,000 ft. of deck. As much as 900 ft. of deck form was in active service at one time, including 750 ft. under completed pavement and 150 ft. erected in advance for the next day's concreting. Workmen stripped the forms from hanging scaffolds suspended by blocks and falls attached at four points to the bridge handrailing, as illustrated by a photograph.

### Concrete Plant

Four portable units made up a concrete plant which could be moved in a day by a crew of ten men from one location to another on the ground alongside the bridge. These units included: (1) a single-chambered Rex Pumpcrete on pneumatic tires, (2) a Construction Machinery Co. 14S mixer on steel wheels, (3) a small Construction Machinery Co. aggregate batcher equipped with a trolley weigh hopper for delivering to the mixer skip, and (4) a Lorain crawler crane operating a ¾-yd. clamshell bucket. Cement was handled in sacks.

Concrete was delivered to the hopper of the pump by the 14S mixer, which turned out 4-sack batches of 1:2:3½ mix containing 7¼ sacks of cement per cu. yd., with 5 gal. of water per sack. When deposited on the deck from the end of the pipe line, concrete was vibrated internally around the reinforcing steel by a

*(Continued on page 134)*

AND WE HAD "Real Bread"
"Our boys," in distant lands, get real bread — made the American way in "portable" kitchens. Just another way Briggs & Stratton gasoline motors are serving — furnishing power for bread mixers, refrigerators, water supply and other specialized applications — in addition to scores of major standard uses.
We're in full production on Briggs & Stratton 4-cycle, air-cooled gasoline motors — for the war program and approved "essential" civilian uses — but there are not enough "new" motors available to supply the demand. As a special service, we are trying to place "used" Briggs & Stratton motors that may not now be in active service, in the hands of those who need them so badly.
If you have, or know of any Briggs & Stratton motors not now in regular use—please write us, stating model numbers and general condition. It makes no difference how old they are. We will assist in making contacts between owners and prospective purchasers.
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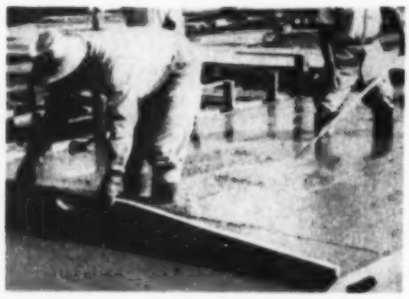
# Trowel *35-minute-old* concrete?

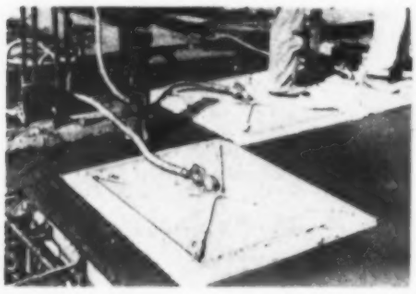
## you CAN...with VACUUM

Imagine 8-inch slump concrete emerging hard enough to walk on and ready for the finishers to start troweling only 10 to 15 minutes after screeding... and after only 4 or 5 minutes under Vacuum Concrete Process mats! Because Vacuum makes such speed possible, leading contractors from coast to coast are using it on job after job . . . to rush important war construction . . . cut their costs . . . and meet rigid government specifications. Here's how it works:

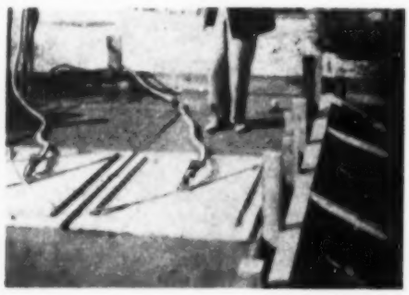
**8:00** Placing of concrete in the slab is begun.



**8:20** End of slab is concreted and screeding is started.



**8:28** First Vacuum Process mats are placed and vacuum applied, drawing out entrapped air and excess water.



**8:33** Concrete is now hard enough to stand on without imprint! Mats are moved ahead.

**8:35** Cement finishers start floating and troweling. Hours of costly finishing time have been gained.

Vacuum Concrete Process equipment is furnished on a rental basis . . . for use in any part of the country. For details, write for folder: "*Speed and Economy for the Contractor*".

**Only the VACUUM PROCESS gives you all these ADVANTAGES:**

Cement finisher production is increased . . . overtime drastically slashed or completely eliminated — even with longer pours.

●

Forms may be stripped in 3 or 4 days . . . 28-day strength is usually obtained in 3 days when Vacuum is used.

●

Wetter mixes, providing easier placing, can be used when excess water is subsequently removed by Vacuum processing.

●

Approximately 50% greater ultimate strength is obtained without using a richer mix... due to lowered water-cement ratio and compaction of concrete.

●

Removal of water and entrapped air produces smooth, void-free wall and ceiling surfaces... reduces pointing... makes possible high-grade monolithic finishes without dust-on mixtures or driers.

**VACUUM CONCRETE, Inc.**
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*Write for name and address of our representative nearest you*

**VACUUM CONCRETE PROCESS**
*FOR SPEED AND ECONOMY plus GREATER STRENGTH*


*(Continued from page 133)*

gasoline-powered portable vibrator. Two men struck off the concrete to required 1½-in. crown with a screed riding on the steel curbs. Behind the screed, the surface was finished with a longitudinal bull float, operated from bridges by two men, followed by a burlap belt drawn over the concrete. Smoothness was checked by a 10-ft. straightedge.

### Integral Traffic Stripe

Within an hour after the placing of the concrete, a permanent traffic stripe 8 in. wide of black magnetic iron oxide was worked into the plastic surface along the center line of the roadway. To maintain accurate alignment, the stripe was applied between angle guides suspended from a traveling bridge, as shown in one of the photographs. At each forward move, the angle guides were set in correct position with the aid of a gage from the steel curb.

Dry pigment was scattered on the concrete between the angle guides and was worked into the surface with hand floats to a depth of ⅛ in. to ¼ in. The 8-in. traffic stripe required about 4 lb. of black magnetic iron oxide for 100 lin. ft.

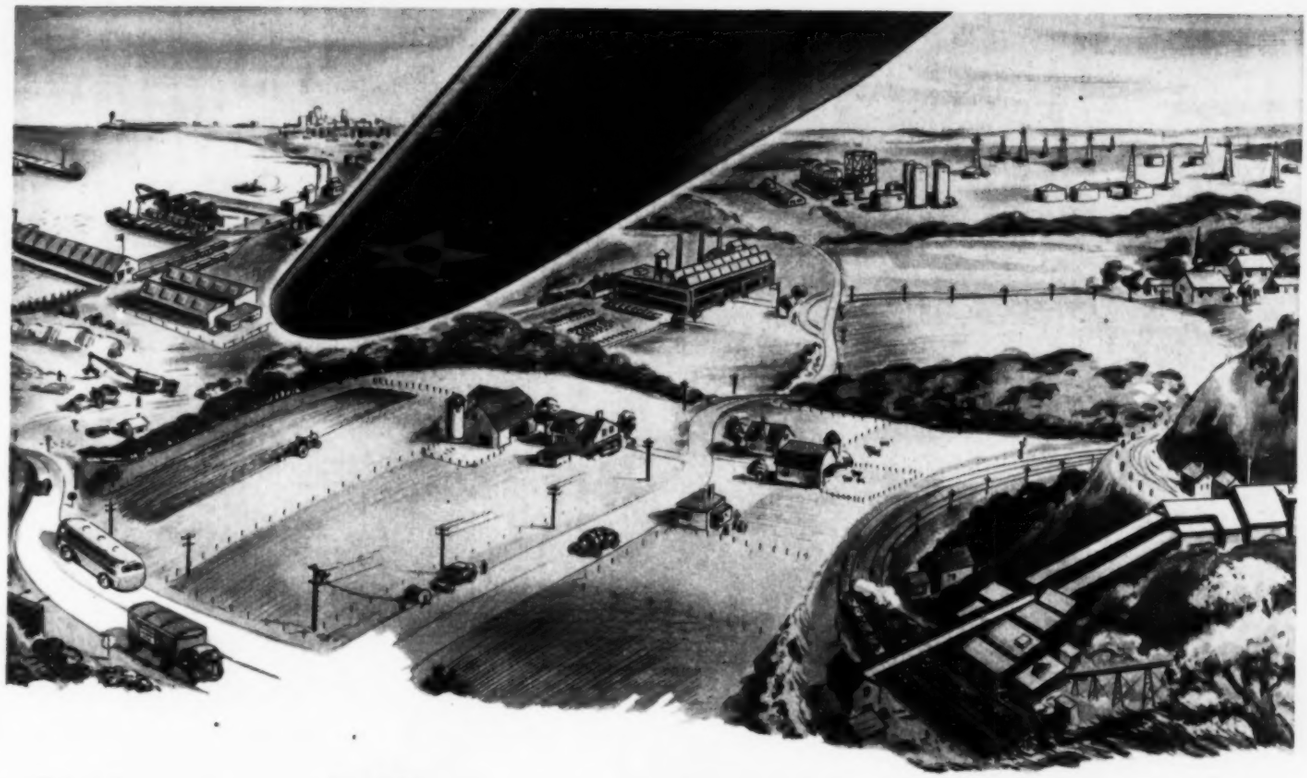
As soon as the traffic stripe was completed, the surface of the concrete pavement was sealed for curing purposes with a transparent membrane of Battenfeld liquid compound applied as a spray. The liquid compound contained a red dye to indicate the area covered by the spray; this dye disappeared within a day, leaving a transparent, impervious film on the pavement.

**STRIPPED SLAB** from which plywood forms have been removed reveals smooth concrete surface on near side of bridge expansion joint. Beyond expansion joint, forms are still in place, supported by wood wedges and shores.

### Deck Reinforcement

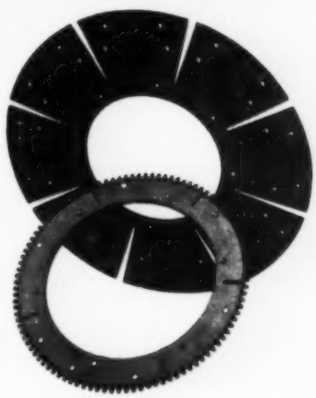
Because of war restrictions, bars of rerolled rail steel had to be substituted for welded bar trusses specified in the original design of the reinforced-concrete deck. Replacing the bar trusses, ⅝-in. round bars were

*(Continued on page 136)*



# *Velvetouch Dependability is Established on* TWO FRONTS

VELVETOUCH Friction Materials are doing an outstanding job in many applications on America's combat planes, notably in brakes and supercharger clutches. On the home front, too, this miracle of powder metallurgy has proven its dependability in all fields where conditions are unusually severe . . . in oil well and marine equipment, in agricultural and industrial machinery, in mining equipment. Especially on tough construction jobs . . . in tractors, trucks, shovels, power take-off units . . . VELVETOUCH is setting new high standards for smooth, positive, trouble-free operation of clutches and brakes.



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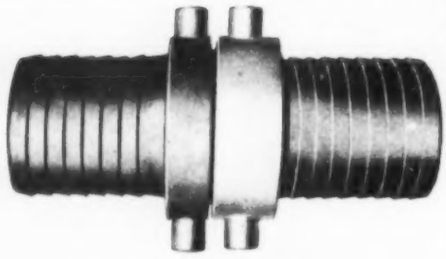

## "KING" Malleable Iron SHANK COUPLINGS

Strong, carefully made couplings of uniform quality, threading and dimensions. Easily inserted in hose and quickly connected and disconnected. Shanks have deep, clean corrugations. Pin lug swivel nuts are well recessed to hold washer when hose is disconnected. *Heavy Pattern* (Illustrated) has shanks long enough for two clamps, and pin lugs on both male and female ends. Sizes, 3" to 8", inclusive. *Regular Pattern* has pin lugs on female only, and shanks designed for one clamp. Sizes 1½" to 3", inclusive. Both patterns formerly made all-brass or part-brass.

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**SINGLE BOLT** **DOUBLE BOLT**

The strongest clamps of their kind, and easiest to attach. Bolt lugs are heavily reinforced. Tongue, and ears for vise jaws, are full width of clamp. Perfect conformance to hose circumference, with broad bearing surface, insures equally distributed compression when clamp is tightened, without cutting into hose cover. Double Bolt style has quadruple take-up, providing exceptional gripping power. Sizes: Single Bolt, for hose ⅞" to 5¼", O.D., Double Bolt, for hose 3½" to 17¼", O.D.

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*(Continued from page 134)*

used transversely on the approach spans at 5½-in. centers top and bottom. Longitudinal steel consisted of 28 lines of ⅝-in. bars near the top of the slab and 17 lines of ½-in. bars near the bottom. Vibration was important in working the concrete around the mass of reinforcing steel and assuring consolidation next to the bars.

Spans 44 to 187 ft. long in the west approach are arranged in continuous girder units with expansion joints as much as 530 ft. apart. Deck expansion joints, incorporating meshed finger-type castings, are similarly spaced to correspond with the locations of the joints between the girder units.

Deck paving of the Iowa approach took 890 cu.yd. of concrete and 118

**ADJUSTABLE TABLE SAW** on bridge deck, product of Construction Machinery Co., makes square and miter cuts in plywood panels and wood pieces for form system.

tons of reinforcing steel. The remainder of the bridge will require 2,910 yd. of concrete and 360 tons of reinforcement.

Flanking the 24-ft. roadway on the north side of the bridge is a 5-ft. concrete sidewalk. This sidewalk will be concreted for the entire length of the bridge as a separate operation. On the south side is an 18-in. steel safety walk requiring no concrete.

### Supervision

Howard, Needles, Tammen & Bergendoff, Kansas City, Mo., designing and supervising engineers for the City of Dubuque Bridge Commission, are represented at the site by Ivan P. Hanson, resident engineer in charge of all operations. The deck paving is being placed for the Bethlehem Steel Co., superstructure contractor, by Melberg & Taylor, under the direction of Clyde B. Taylor, Decorah, Iowa, a member of the firm. Amos Melberg, the other member, makes his headquarters in Cedar Rapids.


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# Railroad Relocation For Oregon Highway

*(Continued from page 55)*

ing mechanism. Accompanying photographs show the character of the work on this contract.

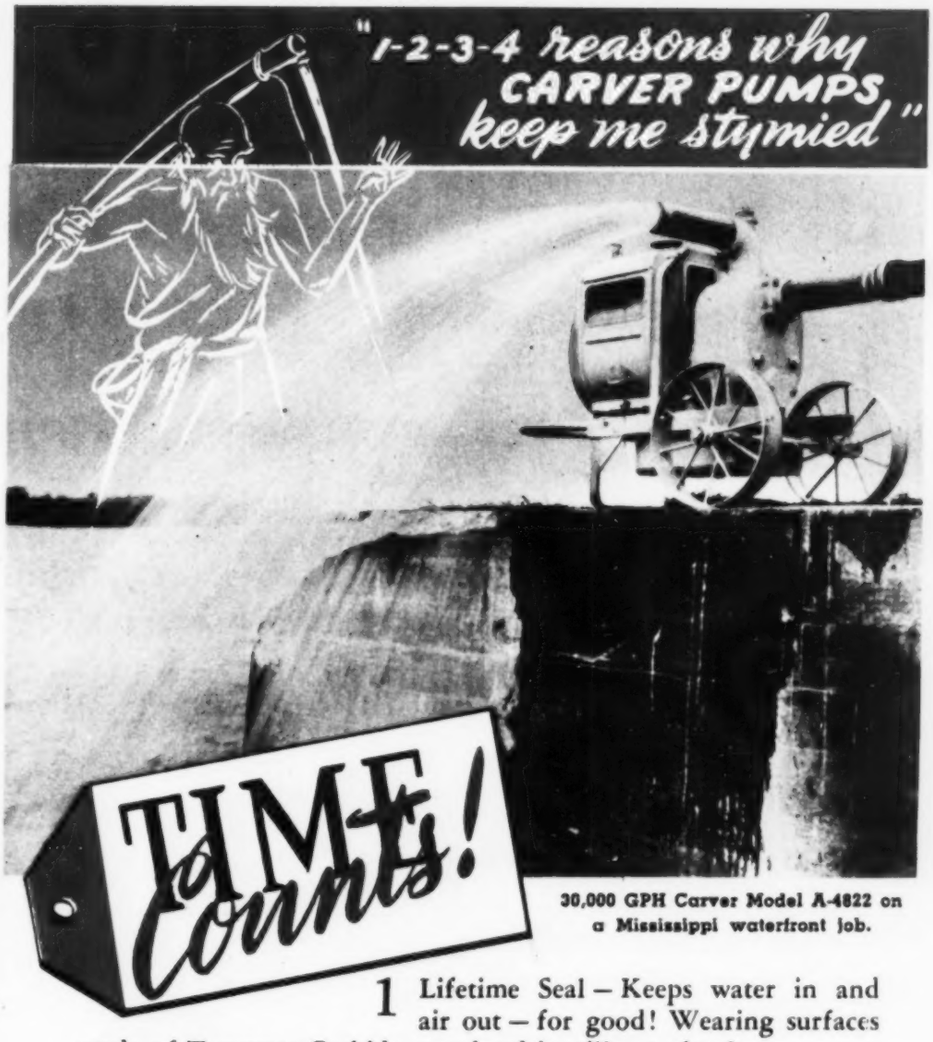
Two later contracts, awarded on June 25 and already completed, provided for construction of the remaining features of the present, limited program. One of these contracts, let to McNutt Bros., Eugene, Ore., at a price slightly in excess of $360,000, covered the construction of 0.7 mi. of new railroad grade and the grading and paving of 1.08 mi. of highway in the approaches to the bridge.

Bridge designs went through two complete revisions before a contract for a temporary structure of treated timber was awarded on June 25 to Barham Bros., Salem, Ore., at a bid price of about $78,000. An original design utilizing structural steel had to be concelled when structural members could not be obtained. After the bridge had been redesigned in reinforced concrete, the second set of plans likewise had to be voided when reinforcing steel was frozen. The final answer was the temporary timber bridge.

### Post-War Plans

When the war ends, the highway department plans to construct a divided four-lane highway from Springfield Junction (the Y formed by U.S. 28 and U.S.99-S.R.58 on the map) to the intersection of High and Broadway in Eugene, utilizing the present 30-ft. pavement for a northbound two-lane road and building a 30-ft. pavement on former railroad right-of-way for southbound traffic. Movement of traffic through the heart of Eugene already has been facilitated by establishing one-way traffic northbound on High and Sixth Sts. and southbound on Seventh and Pearl Sts., as marked by arrows on the map. Proposed future changes of U. S. 99 and State Route 58, shown in part on the map, also have been recommended for construction after the war.

Plans and procedure for present and future improvements were developed under the direction of the author as chief engineer for the Oregon State Highway Commission. Work on the completed project has been under the general supervision of H. G. Smith, construction engineer, and K. D. Lytle, division engineer, State Highway Department.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Carver centrifugals are built in gas engine, electric motor or belt-driven models in capacities from 3,000 to 125,000 GPH. For complete information see your Carver distributor, or write directly to:

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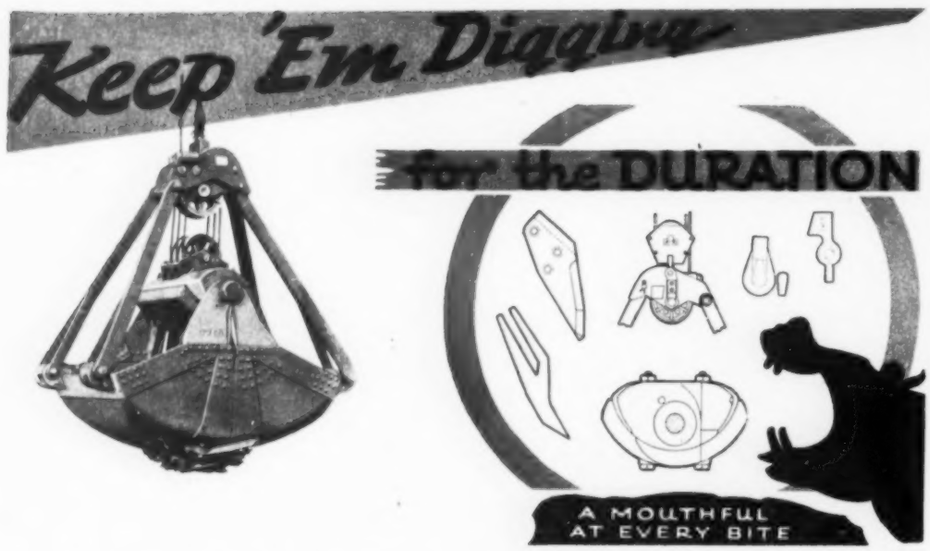


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Distributors will be found ready and able to render prompt, efficient service.

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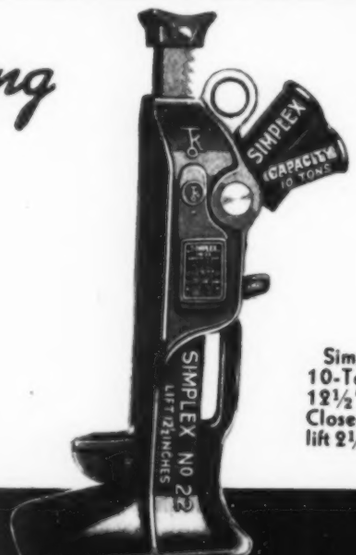


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# *Niagara Falls Weir*

*(Continued from page 59)*

and were hoisted by five-part falls at 250 fpm. A second 1¼-in. track rope for an inspector's car was seldom used, as unusually murky river water made direction of the work from the inspector's car impractical. All parts of the cableway are products of original Lidgerwood design, and Lidgerwood equipment is used for all tramway fittings and apparatus, including the hoist, driven by a Westinghouse 300-hp. motor.

### Preparatory Work

Preliminary work was performed by contractors on both the U. S. and Canadian sides. The Merritt-Chapman & Scott Corp. built the causeway and artificial island, requiring more than 17,000 tons of truck-hauled rock in sizes up to 15½ tons, and erected the tail tower for the U. S. Engineers. Operations by the contractor began on April 9, and erection of the tail tower started June 11. The tower was completed in 14 working days.

On the Canadian side, the Dominion Bridge Co. erected the head tower. Erection of some 40 tons of cable for the cableway and subsequent operation of the completed unit during construction of the weir, which lies on the Canadian side of the international boundary, were carried out by employees of the Hydro Electric Power Commission of Ontario, with the cooperation of the U. S. Engineers. Work on the weir itself started with placement of the first stone on September 9. Occasional stone shortages caused some interruptions of progress.

### Weir Construction

Starting at a point about 400 ft. from the Canadian shore, the weir extends 1,500 ft. toward the American side and terminates 500 ft. from the artificial island. Depth of water along the weir ranged from 7 to 16 ft. and averaged about 11 ft. Under conditions then existing, with the river carrying about 200,000 sec.ft., experience indicated that the pool level above Goat Island on the American side could be raised the desired amount with 5 ft. of water going over the weir, and the rock-fill structure was built to the proper height to give this effect. Construction of the weir by truck-dumping from a steel trestle had been tentatively decided upon during studies made in the past, but shortage of steel and shortness of time precluded use of

*(Continued on page 140)*

# "Buddy, meet an old friend"

You who use this friendly, long-life wire rope here at home can imagine what it would mean to you. Old side kicks who used to work with you are now in distant parts. If ever dependability counted in wire rope, it's doubly vital there. So when a Wickwire-rigged Liberty Ship gets through to them, and from its cargo unloads this reel with the friendly, trusted name, you can be sure it brings cheers.

The boys out there came from every American industry. They know that *you* need Wickwire Rope, too. So they're mighty thankful when you make what you have last longer, so that more can be spared for new shipping and for *their* heavy work along the fronts.

But when you do need more wire rope, please order it without reels, if lengths will permit, so our boys can have this greater convenience. Will you? Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N.Y.

**First Maritime M and Victory Fleet Flag in all New England was awarded to Wickwire for outstanding production achievements.**

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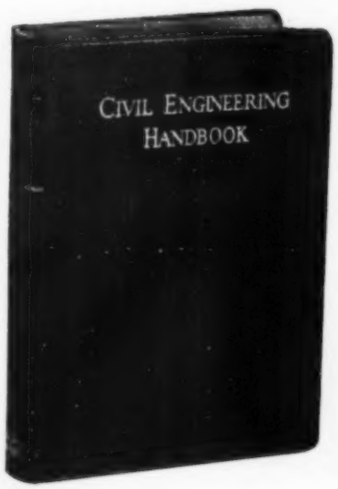


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*(Continued from page 138)*

this method in 1942, when the war induced the two governments to start work immediately.

In cross-section, the weir has a top width of 40 ft., with a theoretical downstream toe slope of 1 on 1¼ and an upstream face slope of 1 on 3. Construction was carried out in four steps corresponding to the four parts of the rock-fill structure. Toe stone weighing 3 to 8 tons were placed first in the downstream portion to a base width which would produce a top width of 15 ft. when the weir was raised to full height, allowing theoretical 1 on 1¼ slopes for both upstream and downstream faces of the toe section.

In the adjacent upstream portion of the weir, the constructors dumped skiploads of core stone (weighing 100 to 500 lb. each), with a 10 percent permissible maximum of quarry chips. The core section, which increased the top width of the weir to nearly 40 ft., was built with an upstream slope of about 1 on 1½. A protective riprap of rectangular facing stone weighing 3 to 8 tons was laid on top of the core to complete this section and bring it up to crest elevation.

To bank the upstream face of the weir to a 1 on 3 slope, in preparation for placing the rectangular facing stone, skiploads of 3-in. bedding stone were dumped in a triangular section against the core. For facing the upstream slope, the specifications called for flat rectangular stone 18 or 30 in. in thickness, with a variation for each stone of not more than 6 in, from nominal size. These stones weighed 3 to 8 tons each. Stone specifications were prepared by the Canadian participants in the project.

### Supervision

For the U. S. Engineers, Col. G. R. Goethals until recently was district engineer, Buffalo District, and Lt. Col. Harland C. Woods is engineer in charge of the project. Roger B. McWhorter, chief engineer, Federal Power Commission, acts for the commission on matters affecting the weir. At the site, the U. S. Engineers were represented during construction of the weir by W. E. Wood, principal inspector, and Harry Lewin, cableway supervisor.

Canadian participation in the undertaking is through the Dominion Water and Power Bureau, Norman Marr, chief hydraulic engineer, and C. G. Cline, senior assistant engineer, with direct responsibility for design and construction delegated to the Hydro Electric Power Commission of Ontario, Otto Holden, chief hydraulic engineer, and David Forgan, construction engineer, represented at the site by E. K. Beam, resident engineer.

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*(Continued)*

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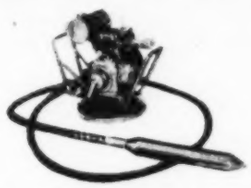

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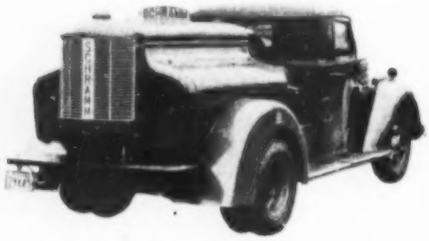

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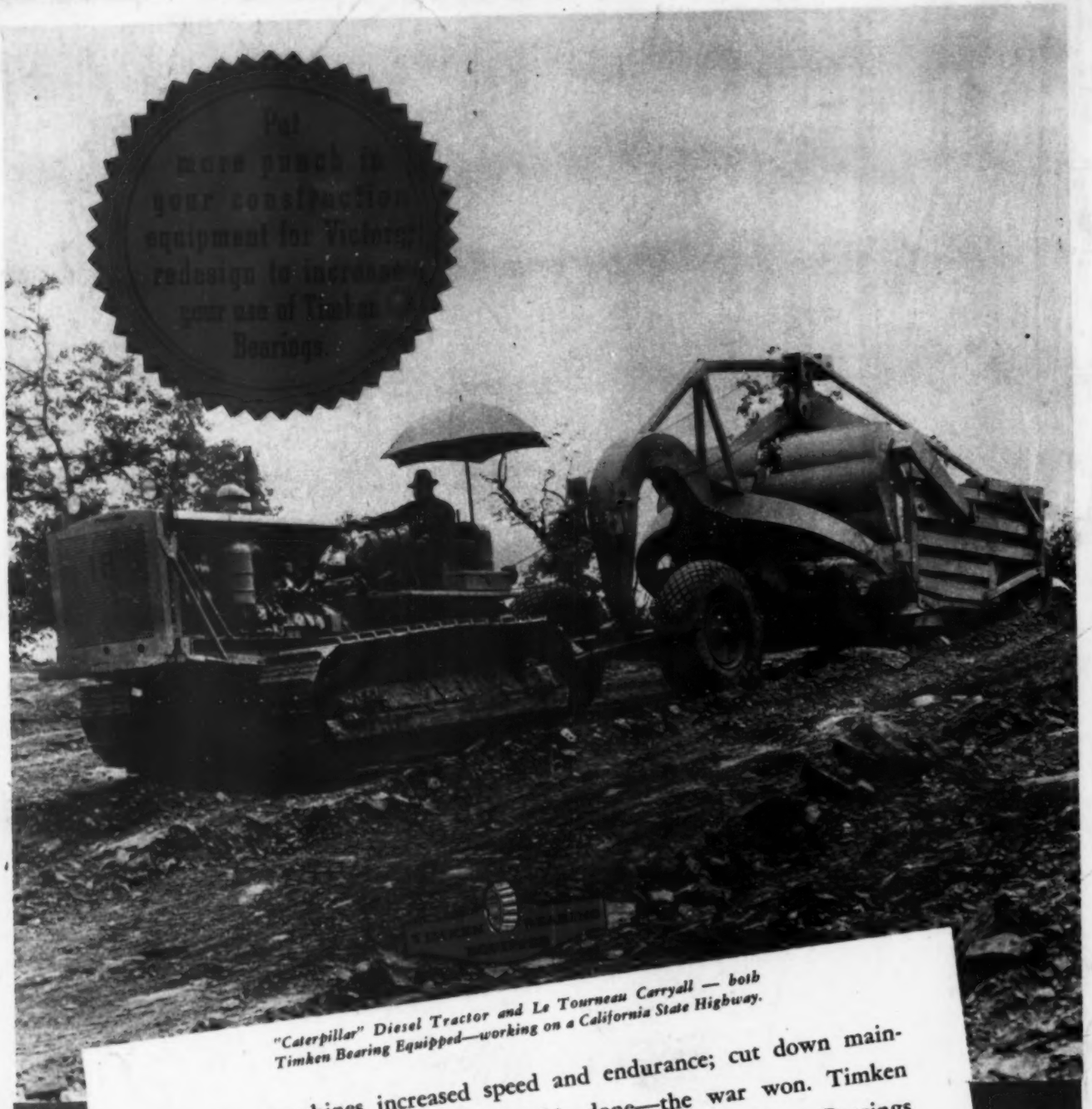


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